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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 5 77 WEST JACKSON BOULEVARD CHICAGO, IL 60604-3590

Page 1 of 17 REPLY TO THE ATTENTION OF: UNDERGROUND INJECTION CONTROL CLASS III AREA PERMIT

Permit Number: MI-133-3G-A002

Project Name: <u>Hersey Potash Project</u>

Pursuant to the provisions of the Safe Drinking Water Act, as amended (42 U.S.C. 300f et seq., commonly known as the SDWA) and implementing regulations promulgated by the United States Environmental Protection Agency (USEPA) at Parts 124, 144, 146 and 147 of Title 40 of the Code of Federal Regulations (CFR), Kalium Chemicals, Ltd. of Rolling Meadows, Illinois is authorized to operate six existing and two proposed solution mining injection wells located in Michigan, Osceola County, in a permit area limited to that described in Part III(D) of this permit. Injection shall be limited to the A-1 Evaporite between 7479 and 7896 feet, upon the express condition that the permittee meet the restrictions set forth herein. The names and locations of wells authorized under this permit and a map of the permit area are provided in Part III(D) of this permit. Injection shall not commence into any newly drilled or converted well until the operator has received authorization in accordance with Part I(E)(11) of this permit. Additional injection wells may be constructed and operated within the permit area provided that the permittee notifies the Director prior to construction and all permit requirements are met.

All references to 40 Code of Federal Regulations are to all regulations that are in effect on the date that this permit is effective.

This permit shall become effective on WAY 15 1992 and shall remain in full force and effect during the operating life of the field, unless this permit is otherwise revoked, terminated, modified or reissued pursuant to 40 CFR 144.39, 144.40 and 144.41. This permit shall also remain in effect upon delegation of primary enforcement responsibility to the State of Michigan unless that State chooses to adopt this permit as a State permit. This permit will be reviewed at least every five (5) years from the effective date specified above.

Signed and dated: 4/15/1991

Dale S. Bryson

Director, Water Division



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 5 77 WEST JACKSON BOULEVARD CHICAGO, IL 60604-3590

Page 1 of 17 UNDERGROUND INJECTION CONTROL MINOR PERMIT MODIFICATION: CLASS III AREA PERMIT

Permit Number: MI-133-3G-A002

Project Name: Hersey Potash Project

Pursuant to the provisions of the Safe Drinking Water Act, as amended (42 U.S.C. 300f et seq., commonly known as the SDWA) and implementing regulations promulgated by the United States Environmental Protection Agency (USEPA) at Parts 124, 144, 146 and 147 of Title 40 Code of Federal Regulations (CFR), Kalium chemicals, Ltd. of Rolling Meadows, Illinois is authorized to operate eleven existing solution mining injection wells located in Michigan, Osceola County, in a permit area limited to that described in Part III(D) of this permit. Injection shall be limited to the Salina Group between 5765 and 7896 feet, upon the express condition that the permittee meet the restrictions set forth herein. The names and locations of wells authorized under this permit and a map of the permit area are provided in Part III(D) of this permit. Injection shall not commence into any newly drilled or converted well until the operator has received authorization in accordance with Part I(E)(11) of this permit. Additional injection wells may be constructed and operated within the permit area provided that the permittee notifies the Director prior to construction and all permit requirements are met.

All references to 40 Code of Federal Regulations are to all regulations that are in effect on the date that this permit is effective.

This permit is a minor permit modification of an existing area permit which was signed on April 15, 1992, and shall remain in full force and effect during the operating life of the field, unless this permit is otherwise revoked, terminated, modified or reissued pursuant to 40 CFR 144.39 or 144.40 and 144.41. This permit shall also remain in effect upon delegation of primary enforcement responsibility to the State of Michigan unless that State chooses to adopt this permit as a State permit. This permit will be reviewed at least every five (5) years from the effective date specified above.

Signed and date: December 15, 1993

Dale S. Bryson

Director, Water Division

PART I

GENERAL PERMIT COMPLIANCE

A. EFFECT OF PERMIT

The permittee is allowed to engage in underground injection in accordance with the conditions of this permit. The underground injection activity, otherwise authorized by this permit or rule, shall not allow the movement of fluid containing any contaminant into underground sources of drinking water, if the presence of that contaminant may cause a violation of any Primary Drinking Water Regulation found in 40 CFR Part 142 or may otherwise adversely affect the health of persons. Any underground injection activity not specifically authorized in this permit or otherwise authorized by permit or rule is prohibited. Issuance of this permit does not convey property rights of any sort or any exclusive privilege; nor does it authorize any injury to persons or property, any invasion of other private rights, or any infringement of State or local law or regulations. Compliance with the terms of this permit does not constitute a defense to any action brought under Section 1431 of the Safe Drinking Water Act (SDWA), or any other law governing protection of public health or the environment.

B. PERMIT ACTIONS

This permit may be modified, revoked and reissued, or terminated for cause as specified in 40 CFR 144.39, 144.40, and 144.41. The filing of a request for a permit modification, revocation and reissuance, termination, or the notification of planned changes or anticipated noncompliance on the part of the permittee does not stay the applicability or enforceability of any permit condition.

C. SEVERABILITY

The provisions of this permit are severable, and if any provision of this permit or the application of any provision of this permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this permit shall not be affected thereby.

D. CONFIDENTIALITY

In accordance with 40 CFR Part 2 and Section 144.5, any information submitted to the USEPA pursuant to this permit may be claimed as confidential by the submitter. Any such claim must be asserted at the time of submission by stamping the words "confidential business information" on each page containing such information.

If no claim is made at the time of submission, USEPA may make the information available to the public without further notice. If a claim is asserted, the validity of the claim will be assessed in accordance with the procedures in 40 CFR Part 2 (Public Information). Claims of confidentiality for the following information will be denied:

- (1) The name and address of the permittee; and,
- (2) Information which deals with the existence, absence or level of contaminants in drinking water.

E. DUTTES AND REQUIREMENTS

- <u>Duty to Comply</u> The permittee shall comply with all conditions of this permit, except to the extent and for the duration such noncompliance is authorized by an emergency permit pursuant to 40 CFR 144.34. Any permit noncompliance constitutes a violation of the SDWA and is grounds for enforcement action, permit termination, revocation and reissuance or modification.
- 2. <u>Penalties for Violations of Permit Conditions</u> Any person who operates these wells in violation of permit conditions is subject to civil penalties, fines, and other enforcement action under the SDWA and may be subject to such actions under the Resource Conservation and Recovery Act. Any person who willfully violates a permit condition may be subject to criminal prosecution.

3. Continuation of Expiring Permits

- (a) <u>Duty to Reapply.</u> If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must submit a complete application for a new permit at least 180 days before this permit expires.
- (b) <u>Permit Extensions</u>. The conditions of an expired permit may continue in force in accordance with 5 U.S.C. 558 (c) and 40 CFR 144.37.
- (c) <u>Effect.</u> Permits continued under 5 U.S.C. 558 (c) and 40 CFR 144.37 remain fully effective and enforceable.
- (d) <u>Enforcement.</u> When the permittee is not in compliance with the conditions of the expiring or expired permit the Director may choose to do any or all of the following:
 - (i) Initiate enforcement action based upon the permit which has been continued;

- (ii) Issue a notice of intent to deny the new permit. If the permit is denied, the owner or operator would then be required to cease the activities authorized by the continued permit or be subject to enforcement action for operation without a permit;
- (iii) Issue a new permit under 40 CFR Part 124 with appropriate conditions; or
- (iv) Take other actions authorized by Underground Injection Control regulations.
- (e) State Continuation A USEPA permit does not continue in force beyond its expiration date under Federal law if at that time a State has primary enforcement responsibility under the SDWA. A State authorized to administer the UIC program may continue either USEPA or State-issued permits until the effective date of the new permits, if State law allows. Otherwise, the facility or activity is operating without a permit from the time of expiration of the old permit to the effective date of the State-issued new permit. Furthermore, if the State does not continue the USEPA permit upon obtaining primary enforcement responsibility, the permittee must obtain a new State permit or be authorized to inject by State rule or he will be injecting without authorization.
- 4. Need to Halt or Reduce Activity not a Defense It shall not be a defense for a permittee in an enforcement action to state that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.
- 5. <u>Duty to Mitigate</u> The permittee shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with this permit.
- 6. Proper Operation and Maintenance The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of the permit.

- 7. <u>Duty to Provide Information</u> The permittee shall furnish to the Director, within thirty (30) days, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee shall also furnish to the Director, upon request, copies of records required by this permit to be retained.
 - 8. <u>Inspection and Entry</u> The permittee shall allow the Director, or an authorized representative, upon the presentation of credentials and other documents as may be required by law to:
 - (a) Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records are kept under the conditions of this permit;
 - (b) Have access to and copy, at reasonable times, any records that must be retained under the conditions of this permit;
 - (c) Inspect at reasonable times any facilities, equipment (including monitoring equipment), practices, or operations regulated or required under this permit; and
 - (d) Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the SDWA, any substances or parameters at any facilities, equipment or operations regulated or required under this permit.

9. Records

- (a) The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, and copies of all records required by this permit, for a period of at least three (3) years from the date of the sample, measurement or report. The permittee shall also maintain records of all data required to complete this permit application and any supplemental information submitted under 40 CFR 144.27, 144.28 and 144.31. These periods may be extended by request of the Director at any time by written notice to the permittee.
- (b) The permittee shall retain records concerning the nature and composition of all injected fluids until three (3) years after the completion of plugging and abandonment of the last operating injection well covered under this permit. Such plugging and abandonment shall be conducted in accordance with the plugging and abandonment plan, contained in Part III(B) of this permit. The owner or operator shall

continue to retain the records after the three (3) year retention period unless he delivers the records to the Regional Administrator or obtains written approval from the Regional Administrator to discard the records.

- (c) Records of monitoring information shall include:
 - (i) The date, exact place, and the time of sampling or measurements;
 - (ii) The individual(s) who performed the sampling or measurements;
 - (iii) A precise description of both sampling methodology and the handling of samples;
 - (iv) The date(s) analyses were performed;
 - (v) The individual(s) who performed the analyses;
 - (vi) The analytical techniques or methods used; and,
 - (vii) The results of such analyses.

10. Notification Requirements

- (a) Planned Changes The permittee shall notify and obtain the Director's approval at least thirty (30) days prior to any planned physical alterations or additions to the permitted facility, or changes in the injection fluids. Within ten (10) days prior to injection, an analysis of new injection fluids shall be submitted to the Director in accordance with Parts II(B)(2) and II(B)(3) of this permit.
- (b) <u>Anticipated Noncompliance</u> The permittee shall give at least thirty (30) days advance notice to the Director for his/her approval of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.
- (c) Transfer of Permits This permit is not transferrable to any person except after notice is sent to the Director at least thirty (30) days prior to transfer and the requirements of 40 CFR §144.38 have been met. The Director may require modification or revocation of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under the SDWA.

(d) <u>Compliance Schedules</u> - Reports of compliance or non-compliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted to the Director no later than thirty (30) days following each schedule date.

(e) Twenty-Four (24) Hour Reporting

- (i) The permittee shall report to the Director any noncompliance which may endanger health or the environment. This information shall be provided orally within twenty-four (24) hour from the time the permittee becomes aware of the circumstances, and shall include the following information:
 - (a) Any monitoring or other information which indicates that any contaminant may cause an endangerment to an underground source of drinking water; or,
 - (b) Any noncompliance with a permit condition or malfunction of the injection system which may cause fluid migration into or between underground sources of drinking water.
- (ii) A written submission shall also be provided as soon as possible but no later than five (5) days from the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance:
- (f) Other Noncompliance All other instances of noncompliance shall also be reported by the permittee in accordance with Part I(E)(10)(e)(i) and (ii) of this permit.
- (g) Other Information If or when the permittee becomes aware that the permittee failed to submit any relevant facts in the permit application, or submitted incorrect information in a permit application or in any report to the Director, the permittee shall promptly submit such facts or corrected information in accordance with 40 CFR 144.51 (1)(8).

- (h) Report on Permit Review Within thirty (30) days of receipt of the final issued permit, the permittee shall report to the Director that the permittee has read and is personally familiar with all terms and conditions of this permit.
- 11. <u>Commencing Injection</u> The permittee shall not commence injection into any newly drilled or converted well until:
 - (a) Formation data and injection fluid analysis have been submitted in accordance with Part II(A)(5) and II(B)(2), respectively;
 - (b) A report on any logs and tests required under Part II(A)(4) of this permit has been submitted.
 - (c) Mechanical integrity of the well has been demonstrated in accordance with Part I(E)(19);
 - (d) Any required corrective action has been performed in accordance with Parts I(E)(18) and III(C); and,
 - (e) Construction is complete and the permittee has submitted to the Director, by certified mail with return receipt requested, a notice of completion of construction using EPA Form 7520-10, a plugging and abandonment plan, a copy of the State permit and either:
 - (i) The Director has inspected or otherwise reviewed the new injection well and finds it is in compliance with the conditions of the permit; or,
 - (ii) The permittee has not received, within thirteen (13) days of the date of the Director's receipt of the report required above, notice from the Director of his or her intent to inspect or otherwise review the new injection well, in which case prior inspection or review is waived and the permittee may commence injection.
- 12. <u>Signatory Requirements</u> All reports or other information requested by the Director shall be signed and certified according to 40 CFR 144.32.
- 13. <u>Notice of Plugging and Abandonment</u> The permittee shall notify the Director at least forty-five (45) working days before conversion or abandonment of any injection well covered under this permit.

- 14. Plugging and Abandonment. The permittee shall plug and abandon any well covered under this permit consistent with 40 CFR 146.10, as provided for in the plugging and abandonment plan contained in Part III(B) of this permit. Within sixty (60) working days after plugging a well, or at the time of the next quarterly report (whichever is shorter), the permittee shall submit a report to the Director. The report shall be certified as accurate by the person who performed the plugging operation, and shall consist of either:
 - (a) A statement that the well was plugged in accordance with the plan previously submitted to the Director; or
 - (b) If the actual plugging differed from the approved plan, a statement defining the actual plugging and explaining why the Director should approve such deviation. Any deviation from a previously approved plan which may endanger underground sources of drinking water is cause for the Director to require the operator to replug the well.
- 15. <u>Inactive Wells</u>. After cessation of injection for two (2) years the permittee shall plug and abandon a well in accordance with the plan and 40 CFR 144.52 (a) (6) unless the permittee has:
 - (a) Provided notice to the Director; and
 - (b) Described actions or procedures, which are deemed satisfactory by the Director, that the permittee will take to ensure that the well will not endanger underground sources of drinking water during the period of temporary abandonment. These actions and procedures shall include compliance with the technical requirements applicable to active injection wells unless waived, in writing, by the Director.
- 16. Financial Responsibility The permittee shall maintain financial responsibility and resources to plug and abandon the underground injection wells in accordance with 40 CFR 144.52(a) (7) as provided in Attachment R of the administrative record corresponding to this permit action which is hereby incorporated by reference as if it appeared fully set forth herein. The permittee shall not substitute an alternative demonstration of financial responsibility from that which the Director has approved, unless the permittee has previously submitted evidence of that alternative demonstration to the Director and the Director has notified the permittee in writing that the alternative demonstration of financial responsibility is acceptable. The financial responsibility mechanism shall be updated periodically, upon request of the Director, except when

Financial Statement Coverage is used as the financial mechanism; this coverage must be updated on an annual basis. If additional wells are to be constructed under the conditions of this permit, the permittee shall increase the amount of financial assurance prior to beginning construction, to cover the additional cost of plugging and abandonment.

17. <u>Insolvency</u>

- (a) In the event of the bankruptcy of the trustee or issuing institution of the financial mechanism, or a suspension or revocation of the authority of the trustee institution to act as trustee or the institution issuing the financial mechanism to issue such an instrument, the permittee must submit an alternative demonstration of financial responsibility acceptable to the Director within sixty (60) days after such event. Failure to do so will result in the termination of this permit pursuant to 40 CFR 144.40(a)(1).
- (b) An owner or operator must also notify the Director by certified mail of the commencement of voluntary or involuntary proceedings under Title 11 (Bankruptcy), U.S. Code, naming the owner or operator as debtor, within ten (10) business days after the commencement of the proceeding. A guarantor of a corporate guarantee must make such a notification if he or she is named as debtor, as required under the terms of the guarantee.

18. Corrective Action

The permittee shall shut-in injection wells whenever the permittee or USEPA determines that operation thereof may be causing upward fluid migration through the well bore of any improperly plugged or unplugged well in the area of review and shall take such steps as the permittee can to properly plug the offending well(s). Any operation of wells which may cause upward fluid migration from an improperly plugged or unplugged well will be considered a violation of this permit. If the permittee or USEPA determines that a permitted well is not in compliance with 40 CFR 146.8, the permittee will immediately shut-in the well until such time as appropriate repairs can be effected and written approval to resume injection is given by the Director. In addition the permittee shall not commence injection under this permit until any and all corrective action has been taken in accordance with any plan contained in Part III(C) of this permit and in accordance with 40 CFR 144.55.

- 19. Mechanical Integrity (MI) The permittee must establish and shall maintain mechanical integrity of any well covered under this area permit in accordance with 40 CFR 146.8. The mechanical integrity demonstration consists of two parts: Part I demonstrates no significant leaks in the casing, tubing, or packer and Part II demonstrates no significant fluid movement into an underground source of drinking water (USDW) through vertical channels adjacent to the wellbore. The permittee will be required to demonstrate both parts of the mechanical integrity demonstration in accordance with Part I(E)(19)(a) and (b) of this permit and thereafter once every sixty (60) months from the date of the last approved demonstration.
 - (a) Pursuant to 40 CFR 146.8(a)(1), the permittee shall, within six (60) days of the permit's effective date, demonstrate the first part of MI for all solution mining injection wells which were not previously tested and approved by the EPA by using the standard annulus pressure test or another approved method.
 - (b) Pursuant to 40 CFR 146.8(a)(2), the permittee shall, within five (5) months of the permit's effective date, demonstrate the second part of MI for all existing wells which were not previously tested and approved by the EPA by running a noise, temperature or oxygen activation log. A descriptive report interpreting the results of such logs and tests shall be prepared by a knowledgeable log analyst and submitted to the Director. However, should the nature of the casing preclude the use of a noise, temperature or oxygen activation log, then pursuant to 40 CFR 146.8(c)(3), cementing records may be used to demonstrate the presence of adequate cement to prevent fluid migration behind the outermost casing and the wellbore.
 - (c) The permittee shall cause all gauges used in mechanical integrity demonstrations to be calibrated to an accuracy of not less than one-half percent (0.5%) of full scale. A copy of the calibration certificate shall be submitted to the Director or his/her representative at the time of demonstration.
 - (d) The permittee shall cease injection in a well if a loss of mechanical integrity occurs or is discovered during a test, or a loss of mechanical integrity as defined by 40 CFR 146.8 becomes evident during operation. Operations shall not resume until the Director gives approval to recommence.
 - (e) The permittee shall notify the Director of the loss of mechanical integrity, in accordance with the reporting procedures in Part I (E) (10) (e) and II (B) (3) (b) of this permit.
 - (f) The permittee shall report the results of a satisfactory mechanical integrity demonstration as provided in Part II (B)(3)(b) of this permit.

- 20. Restriction on Injected Substances. The permittee shall be restricted to the injection of those fluids listed on Page A-2 of 2. No fluids other than those from sources noted in the administrative record and approved by the Director shall be injected. The permittee shall submit, each year, a certified statement attesting to compliance with this requirement.
- 21. Construction, Conversion, operation and plugging abandonment within the Permit Area The permittee may construct, operate, convert, or plug and abandon wells within the permit area, provided that all permit conditions are met and:
 - (a) The permittee notifies the Director at such times as specified in the permit, and,
 - (b) Any additional wells are:
 - (i) Described and identified by location;
 - (ii) Located within the same well field, facility site, reservoir project, or similar unit in the same State, and injecting in the same formation; and,
 - (iii) Operated by the permittee.

PART II

WELL SPECIFIC CONDITIONS FOR UNDERGROUND INJECTION CONTROL PERMITS

A. CONSTRUCTION REQUIREMENTS

- 1. <u>Siting</u> Notwithstanding any other provision of this permit, injection wells shall inject only into a formation which is separated from any USDW by a confining zone that is free of known, open faults or fractures within the area of the review.
- 2. Casing and Cementing Injection wells shall be cased and cemented to prevent the movement of fluids into or between underground sources of drinking water. The casing and cement used in the construction of the wells shall be as contained in Attachments L and M of the administrative record corresponding to this permit action which are hereby incorporated by reference as if they appeared fully set forth herein.
- 3. <u>Wellhead Specifications</u> A female coupling and valve shall be installed on each wellhead, to be used for independent injection pressure readings.
- 4. <u>Logs and Tests</u> Upon approval by the Director of the surface casing and cementation records for all newly drilled or converted wells covered under this permit, any logs and tests noted in Part III of this permit shall be performed, unless already provided. Prior to commencement of injection, the permittee shall submit to the Director for approval a descriptive report prepared by a knowledgeable log analyst interpreting the results of those logs and tests, along with the notice of completion required in Part I(E) (11) of this permit.
- 5. Formation Data If not already provided, the permittee shall determine or calculate the following information concerning the injection formation and submit it to the Director for review and approval, prior to operation:
 - (a) Formation fluid pressure;
 - (b) Fracture pressure; and,
 - (c) Physical and chemical characteristics of the formation fluids.

6. Prohibition of Unauthorized Injection: Any underground injection, except as authorized by permit or rule issued under the UIC program, is prohibited. The construction, including drilling or conversion, of any well required to have a permit is prohibited until the permit has been issued and is effective.

B. OPERATING, MONITORING AND REPORTING REQUIREMENTS

Operating Requirements

Beginning on the effective date of this permit, the permittee is authorized to operate the injection wells, subject to the limitations and monitoring requirements set forth herein. Except during stimulation, injection pressure at the wellhead shall not exceed a maximum which shall be calculated so as to assure that the pressure in the injection zone during injection does not initiate new fractures or propagate existing fractures in the injection zone. In no case, shall injection pressure initiate fractures in the confining zone or cause the movement of injection or formation fluids into an underground source of drinking water. The injection pressure and injected fluid shall be limited and monitored as specified in Parts I(E)(20) and III(A) of this permit.

2. Monitoring Requirements

- (a) Samples and measurements, taken for the purpose of monitoring as required in Part II(B)(3), shall be representative of the monitored activity. Grab samples shall be used to obtain a representative sample of the fluid to be analyzed. Part III(A) of this permit describes the sampling location and required parameters for injection fluid analysis. The permittee shall identify the types of tests and methods used to generate the monitoring data. The monitoring program shall conform to the one described in Part III(A) of this permit.
- (b) Analytical Methods Monitoring of the nature of injected fluids shall comply with applicable analytical methods cited and described in Table I of 40 CFR Section 136.3 or in Appendix III of 40 CFR Part 261 or by other methods that have been approved by the Director.
- (c) <u>Injection Fluid Analysis</u> The nature of the injection fluids shall be monitored as specified in Part III(A) of this permit. An initial analysis of the injection fluid is contained in Attachment H of the administrative record corresponding to this permit action which is hereby incorporated by reference as if it appeared fully set forth herein. Whenever the injection fluid is modified

to the extent that the analysis required by 40 CFR 146.34(a)(7)(iii) is incorrect or incomplete a new analysis shall be provided to the Director at the time of the next quarterly report. The Director may, by written notice require the permittee to sample and analyze the injection fluid at any time.

- (d) <u>Injection Pressure</u> and <u>Cumulative Volume</u> The injection pressure shall be monitored semi-monthly and shall be reported quarterly as specified in Part III(A) of this permit. The injected and produced fluid volumes shall be monitored daily and shall be reported quarterly. All Class III wells may be monitored on a field or project basis rather than an individual well basis by manifold monitoring. Manifold monitoring may be used in cases of facilities consisting of more than one injection well, operating with a common manifold. Separate monitoring systems for each well are not required provided the cwner/operator demonstrates that manifold is comparable to individual well monitoring. All gauges used in monitoring shall be calibrated according to Part I(19)(c) of this permit.
- 3. <u>Reporting Requirements</u> Copies of the monitoring results and all other reports shall be submitted to the Director at the following address:

U.S. Environmental Protection Agency Region V 77 W. Jackson Blvd. Chicago, Illinois 60604 Attn: UIC Section, Enforcement Unit (WD-17J)

(a) Quarterly Reports - The permittee shall submit the results of the injection fluid analyses specified in permit conditions in Part (II) (B) (2) (c) and in Attachment A, no later than the 10th day of the month following the end of the reporting period. Monitoring results shall be recorded on a form which has been signed and certified according to 40 CFR 144.32. Forms shall be submitted at the end of each quarter and shall be postmarked no later than the 10th day of the month following the reporting period. For all new wells, the first report shall be sent no later than the 10th day of the month following the quarter in which injection commences, and for existing wells, the first report shall be sent no later than the 10th day of the month following the first quarter of the final issued permit. This report shall include monthly average, maximum and minimum values for injection pressure, injected and produced volumes and also the specific gravity of the injected fluids.

- (b) Reports on Well Test, Workovers, and Plugging and Abandonment The applicant shall provide the Director with the following
 reports and test results within sixty (60) days of completion of
 the activity:
 - (i) Mechanical integrity tests, except tests which the well fails in which case twenty-four (24) hour reporting under Part I(10)(e) is applicable;
 - (ii) Logging or other test data;
 - (iii) Well workovers (using EPA Form 7520-12); and
 - (iv) Plugging and abandonment.

PART III

SPECIAL CONDITIONS

These special conditions include, but are not limited to plans for maintaining correct operations procedures, monitoring conditions and reporting, as required by 40 CFR Parts 144 and 146. These plans are described in detail in the permittee's application for a permit, and the permittee is required to adhere to these plans as approved by the Director, as follows:

- A. OPERATING, MONITORING AND REPORTING REQUIREMENTS (ATTACHED)
- B. PLUGGING AND ABANDONMENT PLAN (ATTACHED)
- C. CORRECTIVE ACTION PLAN (ATTACHED)
- D. PERMITTED WELLS AND MAP OF PERMIT AREA (ATTACHED)

OPERATING, MONITORING AND REPORTING REQUIREMENTS

LIMITATION

MUNIMUM MONITORING REQ. **MINIMUM** REPORTING REQUIREMENTS

Characteristic

Freq.

<u>Type</u>

*Injection Pressure

1402 psig (MAXIMUM) semi-monthly quarterly

Cumulative Injected Volume

daily

quarterly

Cumulative Produced Volume

daily

quarterly

Specific Gravity

grab quarterly monthly

**Chemical Composition of Injected Fluid

quarterly grab quarterly

SAMPLING LOCATION: The sampling location shall be at each injection pump discharge before the manifold system.

- *The limitation on wellhead pressure serves to prevent confining-formation fracturing. This limitation was calculated using the following formula: [{0.8 psi/ft - (0.433 psi/ft)(specific gravity)} x depth] - 14.7 psi}]. The maximum wellhead pressure is dependent upon depth and specific gravity of the injected fluid. The Salina Group at 5765 feet was used as the depth and a specific gravity of 1.28 was used for the injected fluid.
- **Chemical composition analysis shall include, but not be limited to, the following: Sodium, Calcium, Barium, Magnesium, Total Iron, Chloride, Sulfate, Carbonate, Bicarbonate, Sulfide, Total Dissolved Solids, pH, Resistivity (ohm-meters @ 75°F), and Specific Gravity.

Composition of Injected Fluids

The injection fluids to the solution mining wells will consist of the following:

- low quality solutions from the solution mining operation fresh water from water wells and site run-off from rainfall recycled solution from the refinery

- boiler blow down fluid
- facility purge and flush water

Plugging and Abandonment Cementing Data

- 1. The cavity shall be depressured until the well is completely dead.
- 2. Tubing will be run in and a bridge plug set at a point near the top of the injection zone in the 7" casing (5765 ft).
- 3. The 7" casing will be cut with an explosive cutter at the base of the 9 5/8" intermediate casing (5450 ft top of cement) and removed.
- 4. Tubing will be rerun and the first cement plug will be set in the 7" casing above the bridge plug from 5765 ft to 5450 ft.
- 5. The tubing will be pulled up through the cement and the top of the plug will be tagged to verify its location.
- 6. Plugging of the 9 5/8" casing will continue using 50/50 Poz cement up to within 291 feet of surface in 600 foot increments.
- 7. A 60 sack plug of Class A cement will then be set from 291 feet to surface. The 9 5/8" steel casing will be cut off and capped 3' below surface.

Summary:

Set bridge plug at 5765' in 7" casing

Cut and remove top 5450' of 7" casing

1st plug 5765-5450' Class A 75 sacks

2nd plug 5450-291' 50/50 Poz 1700 sacks 600' increments

3rd plug 291-0' Class A 60 sacks

SEPA

STATES ENVIRONMENTAL PROTECTION PONCY WASHINGTON, O.C. 20460

MT-133-3G-A002

Page B-2 of 3

PLUGGING AND ABANDONMEL T PLAN

WELL NAME & NUMBER, FIELD NAME, LEASE NAME & NUMBER | NAME, ADDRESS, & PHONE NUMBER OF OWNER/OPERATOR

Hersey Potash Facility Solution Mining Wells

Kalium Chemicals, Ltd. Suite 100, The East Tower, 2550 Golf Rd

					Ro	lling Me	adows,	IL 60	008-405	1
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Education And Detaille Office			MI	MI Osceola						
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1										
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 -	╅╸╀╸	+++		3Ž Are	ea Permit					Disposal
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		T T T T	l in a	Area Permi	ıt <u>11</u>			- 771	•	arbon Storage
			U.S	U.S.EPA Permit Number MI-133-3G-A002						
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Size 3 3/8 9 5/8 7" CEMEN Size of Ho Calculated Measured Depth to E Sacks of C	WIND TEG/CEG 17 54 19 40 23-29 NT TO PLUG AN Ille or Pipe in Which Pl Top of Plug (ft.) Sottom of Plug (ft.)	Original Amount (CSG) (tt.) 900 5450 7800 D ABANDON I	90 545 235	9tt in Well 0	7 1/2" 2 1/4" 8 1/2" Piug # 2 9 5/8 291 5450	700 1700 350 Plug # 3 " 9 5/8" 0	Lite/C Lite/C Lite/C Lite/C	OF CEN □ II las⊕Añ lasœAn lasœA0	he Balance Mane Dump Baile Two Plug Mane Two Plug Mane Two Explain:	ethod er Method Method
Size 3 3/8 9 5/8 7" CEMEN Size of Ho Calculated Measured Depth to B Sacks of C Slurry Vol	WI (Ib/RI TEG/CSG 11 54 11 40 23-29 NT TO PLUG AN Ile or Pipe in Which Pi (Top of Plug (ft.) Top of Plug (ft.) Bottom of Plug (ft.) Cement to be Used	Original Amount (CSG) (tt.) 900 5450 7800 D ABANDON I	90 545 235	9tt in Well 0	7 1/2" 2 1/4" 8 1/2" Piug # 2 9 5/8 291 5450 1700	700 1700 350 Plug # 3 " 9 5/8" 0	Lite/C Lite/C Lite/C Lite/C	OF CEN □ II las⊕Añ lasœAn lasœA0	he Balance Mane Dump Baile Two Plug Mane Two Plug Mane Two Explain:	ethod er Method Method
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DESCRIPTION OF PLUGGING PROCEDURE

Plug 2 is continuous, placed in 600 foot increments bottom to top. Esimtated cost/well = \$25,000

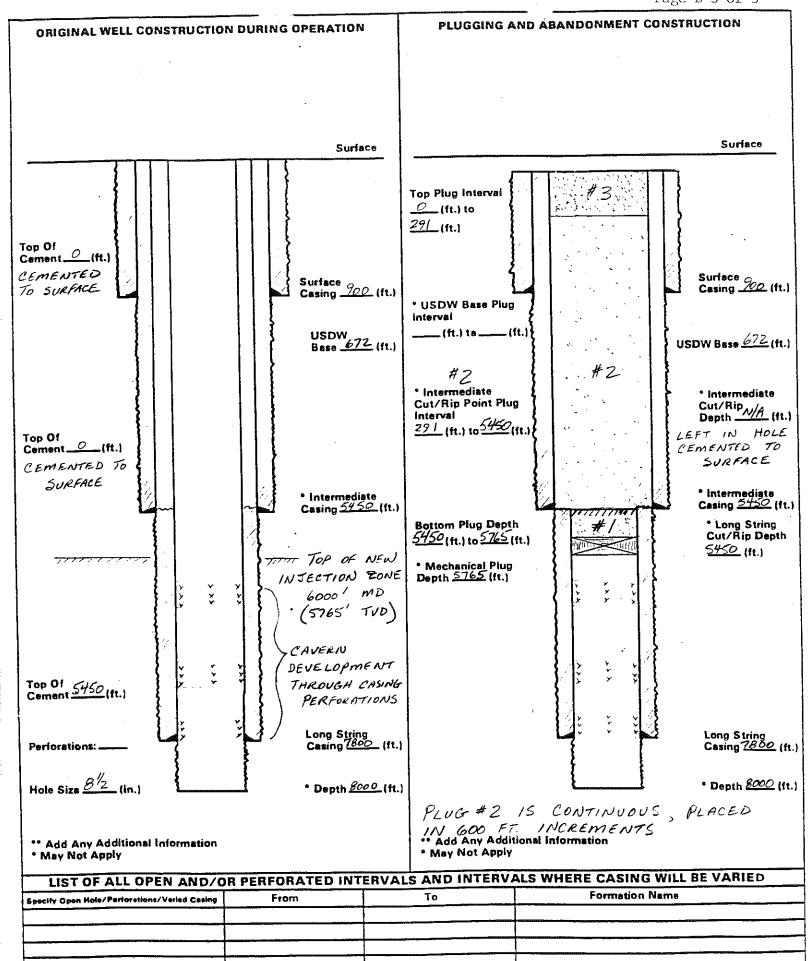
ESTIMATED COST OF PLUGGING AND ABANDONMENT						
Cement	8	Cast Iron Bridge Plug	\$			
Logging	\$	Cement Retainer	8			
Rig or Pulling Unit	8	Miscellaneous	\$			

CERTIFICATION

I certify under the penalty of law that I have examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (Ref.40 CFR 144.32)

NAME AND	OFFIC	IAL T	ITLE	(Please type or print)
Don	J.	Pur	vi	S
Poci	Jon	+ 1	tan	ares

SIGNATURE



CORRECTIVE ACTION PLAN

No corrective action is required at this time

Names and Location of Wells Authorized Under This Permit

Well Name	Surface Location
Well #1041	SW/4-NW/4-NW/4 of Section 26-T17N-R9W
Well #1051	SW/4-NW/4-NW/4 of Section 26-T17N-R9W
Well #2031	W Line-NE/4-SW/4 of Section 26-T17N-R9W
Well #2061	N/2-SW/4 of Section 26-T17N-R9W
Well #1054	SW/4-NW/4-NW/4 of Section 26-T17N-R9W
Well #1013	SW/4-NW/4-NW/4 of Section 26-T17N-R9W
Well #1044	SW/4-NW/4-NW/4 of Section 26-T17N-R9W
Well #1031	NW/4-NW/4-SW/4 of Section 26-T17N-R9W
Well #1032	NW/4-SW/4-NW/4 of Section 26 T17N-R9W
Well #1014	NW/4-SW/4-NW/4 of Section 26-T17N-R9W
Well #2032	SE/4-NW/4-SW/4 of Section 26-T17N-R9W
Well #2062	SE/4-NW/4-SW/4 of Section 26-T17N-R9W
Well #2081	SW/4-NW/4-SE/4 of Section 26-T17N-R9W
Well #2082	SW/4-NW/4-SE/4 of Section 26-T17N-R9W
Well #2041	SW/4-NW/4-SE/4 of Section 26-T17N-R9W
Well #2042	SW/4-NW/4-SE/4 of Section 26-T17N-R9W
Well #1061	NE/4-SE/4-NE/4 of Section 26-T17N-R9W
Well #1062	NW/4-SW/4-NW/4 of Section 26-T17N-R9W
Well #1021	SW/4-NW/4-NW/4 of Section 26-T17N-R9W
Well #1022	SW/4-NW/4-NW/4 of Section 26-T17N-R9W
Well #2071	SW/4-NE/4-SW/4 of Section 26-T17N-R9W
Well #2072	SW/4-NE/4-SW/4 of Section 26-T17N-R9W

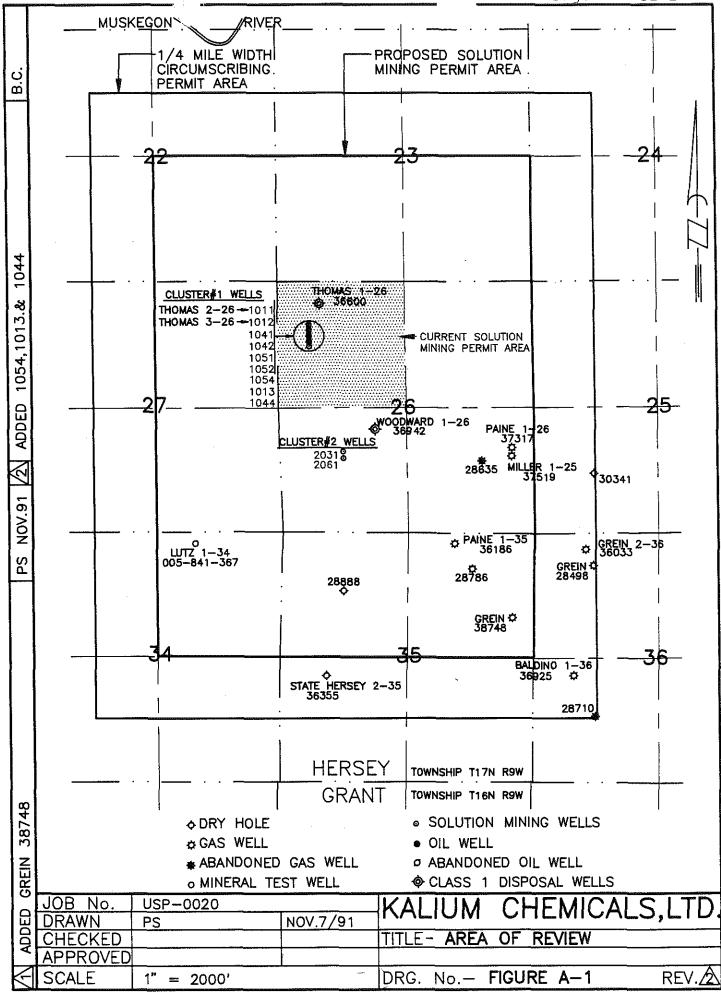
The solution mining injection wells will be limited to the following area: The SE/4 of Section 22, the S/2 of Section 23, the E/2 of Section 27, all Section 26, the NE/4 of Section 34, the N/2 of Section 35, all in Township 17N, Range 9W.

Names and Locations of Wells Authorized Under This Permit

Well Name	Surface Location
1. KCL 1011	SE/4-NW/4-NW/4 of section 26-T17N-R9W
2. KCL 1012	SE/4-NW/4-NW/4 of section 26-T17N-R9W
3. KCL 1041	SW/4-NW/4-NW/4 of section 26-T17N-R9W
4. KCL 1042	SW/4-NW/4-NW/4 of section 26-T17N-R9W
5. KCL 1051	SW/4-NW/4-NW/4 of section 26-T17N-R9W
6. KCL 1052	SW/4-NW/4-NW/4 of section 26-T17N-R9W
7. KCL 2031	W Line-NE/4-SW/4 of section 26-T17N-R9W
8. KCL 2061	N/2-SW/4 of section 26-T17N-R9W
9. KCL 1054	SW/4-NW/4-NW/4 of section 26-T17N-R9W
10. KCL 1013	SW/4-NW/4-NW/4 of section 26-T17N-R9W
11, KCL 1044	SW/4-NW/4-NW/4 of section 26-T17N-R9W

The solution mining injection wells will be limited to the following area:

The SE/4 of Section 22, the S/2 of Section 23, the E/2 of Section 27, all Section 26, the NE/4 of Section 34, the N/2 of Section 35, all in Township 17W, Range 9W.



CLASS II UNDERGROUND INJECTION CONTROL PERMIT MINOR MODIFICATION FOR SIGNATURE

Permittee: KAlium CHEMICALS Ltd. City/State: Rolling MEADOWS, Illinois	UIC Permit No: MI-133-36-A002 County: OSCEOLA Well: HERSEY POTASH PROJECT
A. Changes made to the Permit	
2. A-10E 2 CHANGE MAXIMOM INTECTI 3. ATTACHMENT B REPLACE EXISTING PSA 4.	AND 7479'- 1896' TO SALINA GROUP FROM 5765'S DAI PRESSURE FROM 1823 PSIG 70 1402 PSIG PLAN WITH MEM PSA PIAN
B. Final Permit Concurrence	
1. Permit Writer PATRICK 2. Permit Team Leader 3. Enforcement Coordinator 4. Permit Unit Chief 5. UIC Section Chief 6. SDW Branch Chief 7. UIC-Permit Administrator 8. Water Div. Director 9. UIC-Permit Administrator	Date: 12/14/93 Date: 12/14/93 Date: 12/14/93 Date: 12/14/93 Date: 12/14/93 Date: 12/15/5 Date: 12/15
Tracking Data:	
Financial Assurance: financial STATEME	ENT COURTAGE Amount: M/A
Injection Pressure: 1402 PSic	
Specific Gravity: /. 27	Depth: 5765
Fracture Gradient (If over 0.8):	3.8
Remedial Action Plan Due Date:/	NA
Comments: *********************** Action required	*********
* Water Div. Director: Please sign	both original cover pages (two provided)
UIC: Form Letter	Typing/Hold File?
Mail Co cc DNR w/c	cc Cadmus
Poc Croop Card	

JAINED STATES, TO A SERVICE TO

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

E THE PART OF

REGION 5 77 WEST JACKSON BOULEVARD CHICAGO, IL 60604-3590

Page 1 of 17 REPLY TO THE ATTENTION OF: UNDERGROUND INJECTION CONTROL CLASS III AREA PERMIT

Permit Number: MI-133-3G-A002

Project Name: Hersey Potash Project

Pursuant to the provisions of the Safe Drinking Water Act, as amended (42 U.S.C. 300f et seq., commonly known as the SDWA) and implementing regulations promulgated by the United States Environmental Protection Agency (USEPA) at Parts 124, 144, 146 and 147 of Title 40 of the Code of Federal Regulations (CFR), Kalium Chemicals, Ltd. of Rolling Meadows, Illinois is authorized to operate six existing and two proposed solution mining injection wells located in Michigan, Osceola County, in a permit area limited to that described in Part III(D) of this permit. Injection shall be limited to the A-1 Evaporite between 7479 and 7896 feet, upon the express condition that the permittee meet the restrictions set forth herein. The names and locations of wells authorized under this permit and a map of the permit area are provided in Part III(D) of this permit. Injection shall not commence into any newly drilled or converted well until the operator has received authorization in accordance with Part I(E)(11) of this permit. Additional injection wells may be constructed and operated within the permit area provided that the permittee notifies the Director prior to construction and all permit requirements are met.

All references to 40 Code of Federal Regulations are to all regulations that are in effect on the date that this permit is effective.

This permit shall become effective on MAY 15 1992 and shall remain in full force and effect during the operating life of the field, unless this permit is otherwise revoked, terminated, modified or reissued pursuant to 40 CFR 144.39, 144.40 and 144.41. This permit shall also remain in effect upon delegation of primary enforcement responsibility to the State of Michigan unless that State chooses to adopt this permit as a State permit. This permit will be reviewed at least every five (5) years from the effective date specified above.

Signed and dated:

Dale S. Bryson

Director, Water Division

PART I

GENERAL PERMIT COMPLIANCE

A. EFFECT OF PERMIT

The permittee is allowed to engage in underground injection in accordance with the conditions of this permit. The underground injection activity, otherwise authorized by this permit or rule, shall not allow the movement of fluid containing any contaminant into underground sources of drinking water, if the presence of that contaminant may cause a violation of any Primary Drinking Water Regulation found in 40 CFR Part 142 or may otherwise adversely affect the health of persons. Any underground injection activity not specifically authorized in this permit or otherwise authorized by permit or rule is prohibited. Issuance of this permit does not convey property rights of any sort or any exclusive privilege; nor does it authorize any injury to persons or property, any invasion of other private rights, or any infringement of State or local law or regulations. Compliance with the terms of this permit does not constitute a defense to any action brought under Section 1431 of the Safe Drinking Water Act (SDWA), or any other law governing protection of public health or the environment.

B. PERMIT ACTIONS

This permit may be modified, revoked and reissued, or terminated for cause as specified in 40 CFR 144.39, 144.40, and 144.41. The filing of a request for a permit modification, revocation and reissuance, termination, or the notification of planned changes or anticipated noncompliance on the part of the permittee does not stay the applicability or enforceability of any permit condition.

C. SEVERABILITY

The provisions of this permit are severable, and if any provision of this permit or the application of any provision of this permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this permit shall not be affected thereby.

D. CONFIDENTIALITY

In accordance with 40 CFR Part 2 and Section 144.5, any information submitted to the USEPA pursuant to this permit may be claimed as confidential by the submitter. Any such claim must be asserted at the time of submission by stamping the words "confidential business information" on each page containing such information.

If no claim is made at the time of submission, USEPA may make the information available to the public without further notice. If a claim is asserted, the validity of the claim will be assessed in accordance with the procedures in 40 CFR Part 2 (Public Information). Claims of confidentiality for the following information will be denied:

- (1) The name and address of the permittee; and,
- (2) Information which deals with the existence, absence or level of contaminants in drinking water.

E. DUTTES AND REQUIREMENTS

- <u>Duty to Comply</u> The permittee shall comply with all conditions of this permit, except to the extent and for the duration such noncompliance is authorized by an emergency permit pursuant to 40 CFR 144.34. Any permit noncompliance constitutes a violation of the SDWA and is grounds for enforcement action, permit termination, revocation and reissuance or modification.
- 2. Penalties for Violations of Permit Conditions Any person who operates these wells in violation of permit conditions is subject to civil penalties, fines, and other enforcement action under the SDWA and may be subject to such actions under the Resource Conservation and Recovery Act. Any person who willfully violates a permit condition may be subject to criminal prosecution.

3. Continuation of Expiring Permits

- (a) <u>Duty to Reapply.</u> If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must submit a complete application for a new permit at least 180 days before this permit expires.
- (b) <u>Permit Extensions</u>. The conditions of an expired permit may continue in force in accordance with 5 U.S.C. 558 (c) and 40 CFR 144.37.
- (c) <u>Effect.</u> Permits continued under 5 U.S.C. 558 (c) and 40 CFR 144.37 remain fully effective and enforceable.
- (d) <u>Enforcement.</u> When the permittee is not in compliance with the conditions of the expiring or expired permit the Director may choose to do any or all of the following:
 - (i) Initiate enforcement action based upon the permit which has been continued;

- (ii) Issue a notice of intent to deny the new permit. If the permit is denied, the owner or operator would then be required to cease the activities authorized by the continued permit or be subject to enforcement action for operation without a permit;
- (iii) Issue a new permit under 40 CFR Part 124 with appropriate conditions; or
- (iv) Take other actions authorized by Underground Injection Control regulations.
- (e) State Continuation A USEPA permit does not continue in force beyond its expiration date under Federal law if at that time a State has primary enforcement responsibility under the SDWA. A State authorized to administer the UIC program may continue either USEPA or State-issued permits until the effective date of the new permits, if State law allows. Otherwise, the facility or activity is operating without a permit from the time of expiration of the old permit to the effective date of the State-issued new permit. Furthermore, if the State does not continue the USEPA permit upon obtaining primary enforcement responsibility, the permittee must obtain a new State permit or be authorized to inject by State rule or he will be injecting without authorization.
- 4. Need to Halt or Reduce Activity not a Defense It shall not be a defense for a permittee in an enforcement action to state that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.
- 5. <u>Duty to Mitigate</u> The permittee shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with this permit.
- 6. Proper Operation and Maintenance The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of the permit.

- 7. <u>Duty to Provide Information</u> The permittee shall furnish to the Director, within thirty (30) days, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee shall also furnish to the Director, upon request, copies of records required by this permit to be retained.
 - 8. <u>Inspection and Entry</u> The permittee shall allow the Director, or an authorized representative, upon the presentation of credentials and other documents as may be required by law to:
 - (a) Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records are kept under the conditions of this permit;
 - (b) Have access to and copy, at reasonable times, any records that must be retained under the conditions of this permit;
 - (c) Inspect at reasonable times any facilities, equipment (including monitoring equipment), practices, or operations regulated or required under this permit; and
 - (d) Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the SDWA, any substances or parameters at any facilities, equipment or operations regulated or required under this permit.

9. Records

- (a) The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, and copies of all records required by this permit, for a period of at least three (3) years from the date of the sample, measurement or report. The permittee shall also maintain records of all data required to complete this permit application and any supplemental information submitted under 40 CFR 144.27, 144.28 and 144.31. These periods may be extended by request of the Director at any time by written notice to the permittee.
- (b) The permittee shall retain records concerning the nature and composition of all injected fluids until three (3) years after the completion of plugging and abandonment of the last operating injection well covered under this permit. Such plugging and abandonment shall be conducted in accordance with the plugging and abandonment plan, contained in Part III(B) of this permit. The owner or operator shall

continue to retain the records after the three (3) year retention period unless he delivers the records to the Regional Administrator or obtains written approval from the Regional Administrator to discard the records.

- (c) Records of monitoring information shall include:
 - (i) The date, exact place, and the time of sampling or measurements;
 - (ii) The individual(s) who performed the sampling or measurements;
 - (iii) A precise description of both sampling methodology and the handling of samples;
 - (iv) The date(s) analyses were performed;
 - (v) The individual(s) who performed the analyses;
 - (vi) The analytical techniques or methods used; and,
 - (vii) The results of such analyses.

10. Notification Requirements

- (a) Planned Changes The permittee shall notify and obtain the Director's approval at least thirty (30) days prior to any planned physical alterations or additions to the permitted facility, or changes in the injection fluids. Within ten (10) days prior to injection, an analysis of new injection fluids shall be submitted to the Director in accordance with Parts II(B)(2) and II(B)(3) of this permit.
- (b) <u>Anticipated Noncompliance</u> The permittee shall give at least thirty (30) days advance notice to the Director for his/her approval of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.
- (c) <u>Transfer of Permits</u> This permit is not transferrable to any person except after notice is sent to the Director at least thirty (30) days prior to transfer and the requirements of 40 CFR §144.38 have been met. The Director may require modification or revocation of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under the SDWA.

(d) <u>Compliance Schedules</u> - Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted to the Director no later than thirty (30) days following each schedule date.

(e) Twenty-Four (24) Hour Reporting

- (i) The permittee shall report to the Director any noncompliance which may endanger health or the environment. This information shall be provided orally within twenty-four (24) hour from the time the permittee becomes aware of the circumstances, and shall include the following information:
 - (a) Any monitoring or other information which indicates that any contaminant may cause an endangerment to an underground source of drinking water; or,
 - (b) Any noncompliance with a permit condition or malfunction of the injection system which may cause fluid migration into or between underground sources of drinking water.
- (ii) A written submission shall also be provided as soon as possible but no later than five (5) days from the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance:
- (f) Other Noncompliance All other instances of noncompliance shall also be reported by the permittee in accordance with Part I(E)(10)(e)(i) and (ii) of this permit.
- (g) Other Information If or when the permittee becomes aware that the permittee failed to submit any relevant facts in the permit application, or submitted incorrect information in a permit application or in any report to the Director, the permittee shall promptly submit such facts or corrected information in accordance with 40 CFR 144.51 (1) (8).

- (h) Report on Permit Review Within thirty (30) days of receipt of the final issued permit, the permittee shall report to the Director that the permittee has read and is personally familiar with all terms and conditions of this permit.
- 11. <u>Commencing Injection</u> The permittee shall not commence injection into any newly drilled or converted well until:
 - (a) Formation data and injection fluid analysis have been submitted in accordance with Part II(A)(5) and II(B)(2), respectively;
 - (b) A report on any logs and tests required under Part II(A)(4) of this permit has been submitted.
 - (c) Mechanical integrity of the well has been demonstrated in accordance with Part I(E)(19);
 - (d) Any required corrective action has been performed in accordance with Parts I(E)(18) and III(C); and,
 - (e) Construction is complete and the permittee has submitted to the Director, by certified mail with return receipt requested, a notice of completion of construction using EPA Form 7520-10, a plugging and abandonment plan, a copy of the State permit and either:
 - (i) The Director has inspected or otherwise reviewed the new injection well and finds it is in compliance with the conditions of the permit; or,
 - (ii) The permittee has not received, within thirteen (13) days of the date of the Director's receipt of the report required above, notice from the Director of his or her intent to inspect or otherwise review the new injection well, in which case prior inspection or review is waived and the permittee may commence injection.
- 12. <u>Signatory Requirements</u> All reports or other information requested by the Director shall be signed and certified according to 40 CFR 144.32.
- 13. <u>Notice of Plugging and Abandonment</u> The permittee shall notify the Director at least forty-five (45) working days before conversion or abandonment of any injection well covered under this permit.

- 14. Plugging and Abandonment. The permittee shall plug and abandon any well covered under this permit consistent with 40 CFR 146.10, as provided for in the plugging and abandonment plan contained in Part III(B) of this permit. Within sixty (60) working days after plugging a well, or at the time of the next quarterly report (whichever is shorter), the permittee shall submit a report to the Director. The report shall be certified as accurate by the person who performed the plugging operation, and shall consist of either:
 - (a) A statement that the well was plugged in accordance with the plan previously submitted to the Director; or
 - (b) If the actual plugging differed from the approved plan, a statement defining the actual plugging and explaining why the Director should approve such deviation. Any deviation from a previously approved plan which may endanger underground sources of drinking water is cause for the Director to require the operator to replug the well.
- 15. <u>Inactive Wells</u>. After cessation of injection for two (2) years the permittee shall plug and abandon a well in accordance with the plan and 40 CFR 144.52 (a) (6) unless the permittee has:
 - (a) Provided notice to the Director; and
 - (b) Described actions or procedures, which are deemed satisfactory by the Director, that the permittee will take to ensure that the well will not endanger underground sources of drinking water during the period of temporary abandonment. These actions and procedures shall include compliance with the technical requirements applicable to active injection wells unless waived, in writing, by the Director.
- 16. Financial Responsibility The permittee shall maintain financial responsibility and resources to plug and abandon the underground injection wells in accordance with 40 CFR 144.52(a)(7) as provided in Attachment R of the administrative record corresponding to this permit action which is hereby incorporated by reference as if it appeared fully set forth herein. The permittee shall not substitute an alternative demonstration of financial responsibility from that which the Director has approved, unless the permittee has previously submitted evidence of that alternative demonstration to the Director and the Director has notified the permittee in writing that the alternative demonstration of financial responsibility is acceptable. The financial responsibility mechanism shall be updated periodically, upon request of the Director, except when

Financial Statement Coverage is used as the financial mechanism; this coverage must be updated on an annual basis. If additional wells are to be constructed under the conditions of this permit, the permittee shall increase the amount of financial assurance prior to beginning construction, to cover the additional cost of plugging and abandonment.

17. <u>Insolvency</u>

- (a) In the event of the bankruptcy of the trustee or issuing institution of the financial mechanism, or a suspension or revocation of the authority of the trustee institution to act as trustee or the institution issuing the financial mechanism to issue such an instrument, the permittee must submit an alternative demonstration of financial responsibility acceptable to the Director within sixty (60) days after such event. Failure to do so will result in the termination of this permit pursuant to 40 CFR 144.40(a)(1).
- (b) An owner or operator must also notify the Director by certified mail of the commencement of voluntary or involuntary proceedings under Title 11 (Bankruptcy), U.S. Code, naming the owner or operator as debtor, within ten (10) business days after the commencement of the proceeding. A guarantor of a corporate guarantee must make such a notification if he or she is named as debtor, as required under the terms of the guarantee.

18. <u>Corrective Action</u>

The permittee shall shut-in injection wells whenever the permittee or USEPA determines that operation thereof may be causing upward fluid migration through the well bore of any improperly plugged or unplugged well in the area of review and shall take such steps as the permittee can to properly plug the offending well(s). Any operation of wells which may cause upward fluid migration from an improperly plugged or unplugged well will be considered a violation of this permit. If the permittee or USEPA determines that a permitted well is not in compliance with 40 CFR 146.8, the permittee will immediately shut-in the well until such time as appropriate repairs can be effected and written approval to resume injection is given by the Director. In addition the permittee shall not commence injection under this permit until any and all corrective action has been taken in accordance with any plan contained in Part III(C) of this permit and in accordance with 40 CFR 144.55.

- 19. Mechanical Integrity (MI) The permittee must establish and shall maintain mechanical integrity of any well covered under this area permit in accordance with 40 CFR 146.8. The mechanical integrity demonstration consists of two parts: Part I demonstrates no significant leaks in the casing, tubing, or packer and Part II demonstrates no significant fluid movement into an underground source of drinking water (USDW) through vertical channels adjacent to the wellbore. The permittee will be required to demonstrate both parts of the mechanical integrity demonstration in accordance with Part I(E)(19)(a) and (b) of this permit and thereafter once every sixty (60) months from the date of the last approved demonstration.
 - (a) Pursuant to 40 CFR 146.8(a)(1), the permittee shall, within six (60) days of the permit's effective date, demonstrate the first part of MI for all solution mining injection wells which were not previously tested and approved by the EPA by using the standard annulus pressure test or another approved method.
 - (b) Pursuant to 40 CFR 146.8(a)(2), the permittee shall, within five (5) months of the permit's effective date, demonstrate the second part of MI for all existing wells which were not previously tested and approved by the EPA by running a noise, temperature or oxygen activation log. A descriptive report interpreting the results of such logs and tests shall be prepared by a knowledgeable log analyst and submitted to the Director. However, should the nature of the casing preclude the use of a noise, temperature or oxygen activation log, then pursuant to 40 CFR 146.8(c)(3), cementing records may be used to demonstrate the presence of adequate cement to prevent fluid migration behind the outermost casing and the wellbore.
 - (c) The permittee shall cause all gauges used in mechanical integrity demonstrations to be calibrated to an accuracy of not less than one-half percent (0.5%) of full scale. A copy of the calibration certificate shall be submitted to the Director or his/her representative at the time of demonstration.
 - (d) The permittee shall cease injection in a well if a loss of mechanical integrity occurs or is discovered during a test, or a loss of mechanical integrity as defined by 40 CFR 146.8 becomes evident during operation. Operations shall not resume until the Director gives approval to recommence.
 - (e) The permittee shall notify the Director of the loss of mechanical integrity, in accordance with the reporting procedures in Part I (E)(10)(e) and II (B)(3)(b) of this permit.
 - (f) The permittee shall report the results of a satisfactory mechanical integrity demonstration as provided in Part II (B)(3)(b) of this permit.

- 20. Restriction on Injected Substances. The permittee shall be restricted to the injection of those fluids listed on Page A-2 of 2. No fluids other than those from sources noted in the administrative record and approved by the Director shall be injected. The permittee shall submit, each year, a certified statement attesting to compliance with this requirement.
- 21. Construction, Conversion, operation and plugging abandonment within the Permit Area The permittee may construct, operate, convert, or plug and abandon wells within the permit area, provided that all permit conditions are met and:
 - (a) The permittee notifies the Director at such times as specified in the permit, and,
 - (b) Any additional wells are:
 - (i) Described and identified by location;
 - (ii) Located within the same well field, facility site, reservoir project, or similar unit in the same State, and injecting in the same formation; and,
 - (iii) Operated by the permittee.

PART II

WELL SPECIFIC CONDITIONS FOR UNDERGROUND INJECTION CONTROL PERMITS

A. CONSTRUCTION REQUIREMENTS

- Siting Notwithstanding any other provision of this permit, injection wells shall inject only into a formation which is separated from any USDW by a confining zone that is free of known, open faults or fractures within the area of the review.
- 2. <u>Casing and Cementing</u> Injection wells shall be cased and cemented to prevent the movement of fluids into or between underground sources of drinking water. The casing and cement used in the construction of the wells shall be as contained in Attachments L and M of the administrative record corresponding to this permit action which are hereby incorporated by reference as if they appeared fully set forth herein.
- 3. <u>Wellhead Specifications</u> A female coupling and valve shall be installed on each wellhead, to be used for independent injection pressure readings.
- 4. <u>Logs and Tests</u> Upon approval by the Director of the surface casing and cementation records for all newly drilled or converted wells covered under this permit, any logs and tests noted in Part III of this permit shall be performed, unless already provided. Prior to commencement of injection, the permittee shall submit to the Director for approval a descriptive report prepared by a knowledgeable log analyst interpreting the results of those logs and tests, along with the notice of completion required in Part I(E)(11) of this permit.
- 5. <u>Formation Data</u> If not already provided, the permittee shall determine or calculate the following information concerning the injection formation and submit it to the Director for review and approval, prior to operation:
 - (a) Formation fluid pressure;
 - (b) Fracture pressure; and,
 - (c) Physical and chemical characteristics of the formation fluids.

6. Prohibition of Unauthorized Injection: Any underground injection, except as authorized by permit or rule issued under the UIC program, is prohibited. The construction, including drilling or conversion, of any well required to have a permit is prohibited until the permit has been issued and is effective.

B. OPERATING, MONITORING AND REPORTING REQUIREMENTS

1. Operating Requirements

Beginning on the effective date of this permit, the permittee is authorized to operate the injection wells, subject to the limitations and monitoring requirements set forth herein. Except during stimulation, injection pressure at the wellhead shall not exceed a maximum which shall be calculated so as to assure that the pressure in the injection zone during injection does not initiate new fractures or propagate existing fractures in the injection zone. In no case, shall injection pressure initiate fractures in the confining zone or cause the movement of injection or formation fluids into an underground source of drinking water. The injection pressure and injected fluid shall be limited and monitored as specified in Parts I(E)(20) and III(A) of this permit.

2. Monitoring Requirements

- (a) Samples and measurements, taken for the purpose of monitoring as required in Part II(B)(3), shall be representative of the monitored activity. Grab samples shall be used to obtain a representative sample of the fluid to be analyzed. Part III(A) of this permit describes the sampling location and required parameters for injection fluid analysis. The permittee shall identify the types of tests and methods used to generate the monitoring data. The monitoring program shall conform to the one described in Part III(A) of this permit.
- (b) Analytical Methods Monitoring of the nature of injected fluids shall comply with applicable analytical methods cited and described in Table I of 40 CFR Section 136.3 or in Appendix III of 40 CFR Part 261 or by other methods that have been approved by the Director.
- (c) <u>Injection Fluid Analysis</u> The nature of the injection fluids shall be monitored as specified in Part III(A) of this permit. An initial analysis of the injection fluid is contained in Attachment H of the administrative record corresponding to this permit action which is hereby incorporated by reference as if it appeared fully set forth herein. Whenever the injection fluid is modified

to the extent that the analysis required by 40 CFR 146.34(a)(7)(iii) is incorrect or incomplete a new analysis shall be provided to the Director at the time of the next quarterly report. The Director may, by written notice require the permittee to sample and analyze the injection fluid at any time.

- (d) Injection Pressure and Cumulative Volume The injection pressure shall be monitored semi-monthly and shall be reported quarterly as specified in Part III(A) of this permit. The injected and produced fluid volumes shall be monitored daily and shall be reported quarterly. All Class III wells may be monitored on a field or project basis rather than an individual well basis by manifold monitoring. Manifold monitoring may be used in cases of facilities consisting of more than one injection well, operating with a common manifold. Separate monitoring systems for each well are not required provided the owner/operator demonstrates that manifold is comparable to individual well monitoring. All gauges used in monitoring shall be calibrated according to Part I(19)(c) of this permit.
- 3. <u>Reporting Requirements</u> Copies of the monitoring results and all other reports shall be submitted to the Director at the following address:

U.S. Environmental Protection Agency Region V 77 W. Jackson Blvd. Chicago, Illinois 60604 Attn: UIC Section, Enforcement Unit (WD-17J)

(a) Quarterly Reports - The permittee shall submit the results of the injection fluid analyses specified in permit conditions in Part (II) (B) (2) (c) and in Attachment A, no later than the 10th day of the month following the end of the reporting period. Monitoring results shall be recorded on a form which has been signed and certified according to 40 CFR 144.32. Forms shall be submitted at the end of each quarter and shall be postmarked no later than the 10th day of the month following the reporting period. For all new wells, the first report shall be sent no later than the 10th day of the month following the quarter in which injection commences, and for existing wells, the first report shall be sent no later than the 10th day of the month following the first quarter of the final issued permit. This report shall include monthly average, maximum and minimum values for injection pressure, injected and produced volumes and also the specific gravity of the injected fluids.

- (b) Reports on Well Test, Workovers, and Plugging and Abandonment —
 The applicant shall provide the Director with the following reports and test results within sixty (60) days of completion of the activity:
 - (i) Mechanical integrity tests, except tests which the well fails in which case twenty-four (24) hour reporting under Part I(10)(e) is applicable;
 - (ii) Logging or other test data;
 - (iii) Well workovers (using EPA Form 7520-12); and
 - (iv) Plugging and abandonment.

PART III

SPECIAL CONDITIONS

These special conditions include, but are not limited to plans for maintaining correct operations procedures, monitoring conditions and reporting, as required by 40 CFR Parts 144 and 146. These plans are described in detail in the permittee's application for a permit, and the permittee is required to adhere to these plans as approved by the Director, as follows:

- A. OPERATING, MONITORING AND REPORTING REQUIREMENTS (ATTACHED)
- B. PLUGGING AND ABANDONMENT PLAN (ATTACHED)
- C. CORRECTIVE ACTION PLAN (ATTACHED)
- D. PERMITTED WELLS AND MAP OF PERMIT AREA (ATTACHED)

MUNIMUM

MINIMUM

OPERATING, MONITORING AND REPORTING REQUIREMENTS

LIMITATION MONITORING REQ. REPORTING REQUIREMENTS

Characteristic Freq. Type

*Injection Pressure 1823 psig (MAXIMUM) semi-monthly quarterly

Cumulative Injected Volume daily quarterly

Cumulative Produced Volume daily quarterly

Specific Gravity monthly grab quarterly

**Chemical Composition of Injected Fluid quarterly grab quarterly

SAMPLING LOCATION: The sampling location shall be at each injection pump discharge before the manifold system

- *The limitation on wellhead pressure serves to prevent confining-formation fracturing. This limitation was calculated using the following formula: [{0.8 psi/ft (0.433 psi/ft)(specific gravity)} x depth] 14.7 psi}]. The maximum wellhead pressure is dependent upon depth and specific gravity of the injected fluid. The A-1 Evaporite at 7479 feet was used as the depth and a specific gravity of 1.28 was used for the injected fluid.
- **Chemical composition analysis shall include, but not be limited to, the following: Sodium, Calcium, Barium, Magnesium, Total Iron, Chloride, Sulfate, Carbonate, Bicarbonate, Sulfide, Total Dissolved Solids, pH, Resistivity (ohm-meters @ 75°F), and Specific Gravity.

Composition of Injected Fluids

The injection fluids to the solution mining wells will consist of the following:

- low quality solutions from the solution mining operation fresh water from water wells and site run-off from rainfall
- recycled solution from the refinery boiler blow down fluid
- facility purge and flush water

Plugging and Abandonment Cementing Data

- 1. The cavity shall be depressured until the well is completely dead.
- 2. Run in with tubing and bridge plug to a point at, or near, the top of the cavity.
- 3. Set bridge plug in competent casing as close as possible to the top of the cavity.
- 4. Rig up cementing truck and set 50 sack plug of Class A cement above bridge plug. 50 sack plug, Class A = 226'.
- 5. Pull tubing up through cement to top of plug.
- 6. Continue to plug 7" casing, using 50/50 Poz cement. Yield: 1.29 cu. ft./sack; 100 sack = 129 cu. ft. = 583'/100 sacks.
- 7. Continue to plug to within 226' of surface. Set 50 sack plug of Class A cement at surface. Cut off and cap 3' below surface.
- 8. Summary: Set bridge plug at 7780'.

1st	plug	7780-7574 <i>'</i>	Class	A, 3% Cl ₂	50 s	sacks
2nd	plug	7574-6991'	50-50		100	sacks
3rd	plug	6991-6400'	50-50	Poz	100	sacks
4th	plug	6400-5825'	50-50	Poz	100	sacks
5th	plug	5825-5242'	50-50	Poz	100	sacks
6th	plug	5242-4659'	50-50	Poz	100	sacks
7th	plug	4659-4076'	50-50	Poz	100	sacks
8th	plug	4076-3493'	50-50	Poz	100	sacks
9th	plug	3493-2910'	50-50	Poz	100	sacks
10	plug	2910-2327'	50-50	Poz	100	sacks
11	plug	2327-1744'	50-50	Poz	100	sacks
12	plug	1744-1161'	50-50	Poz	100	sacks
13	plug	1161-576'	50-50	Poz	100	sacks
14	plug	576-291 ′	50-50	Poz	50	sacks
15	plug	291-0'	Class	A	60	sacks

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY WASHINGTON, D.C. 20460

Wells drilled after

PLUGGING AND ABANDONMENT PLAN

WEL! NAME & NUMBER, FIELD NAME, LEASE NAME & NUMBER Hersey Potash Facility Solution Mining Wells

NAME, ADDRESS, & PHONE NUMBER OF OWNER/OPERATOR Kalium Chemicals, Ltd.

Suite 100, The East Tower, 2550 Golf Road Rolling Meadows, IL 60008-4051

	Locate Well And Outline Unit On Section Plat — 640 Acres								
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Size of Hole or Pipe in Which Pfug Will Be Placed (inches)

Calculated Top of Plug (ft.)

Measured Too of Plug (h.)

Depth to Sottom of Plug (ft.)

Sacks of Cament to be Used

Slurry Volume to be Used (cu. ft.)

COUNTY STATE MI Osceola

BURFACE LOCATION DESCRIPTION

LOCATE WELL IN TWO DIRECTIONS FROM MEAREST LINES OF QUARTER SECTION AND DRILLING UNIT Surface

_ ft. From (N/S) ___ Line Of Quarter Section Location -

_ ft. From (E/W) _ Line Of Quarter Section

TYPE OF AUTHORIZATION

☐ Individual Permit ☐ Rule

🕅 Area Permit Number of Wells In Area Permit .

WELL ☐ Class t ACTIVITY Hazardous ■ Nonhazardous ☐ Class II

STATE PERMIT NUMBER

☐ Brine Disposal □ Enhanced Recover ☐ Hydrocarbon Stora

Class III ☐ Class V

CASING/TUBING/CEMENT RECORD AFTER PLUGGING AND ABANDONMENT

METHOD OF EMPLACEMENT OF CEMENT PLUGS

Siro	MA INVAILABO CEG	Crepton Amount (CSG)	CSG to be Left at 4444	Heat Sign (etc.)	Serie Comun Vent	Type	
18-5/8	86	600	600	24"	8 4 0 Li	te/Clas	ЬΑ
13-3/8	54	900	900	17-1/2	' 700 Li	te/Clas	ĖΑ
9-5/0	40	5450	5450	12-1/4	' 1700 Li	te/Clas	БΑ
7	23-29	7800	7800	8-1/2	' 1180 li	te/Clas	S A

☐ The Balance Method ☐ The Dump Bailer Method ☐ The Two Plug Method ☐ Other, Explain:

Plug# CEMENT TO PLUG AND ABANDON DATA: |Plug # Plug# Plug #

7574

77du

Ξ'n

U.S.EPA Permit Number

Plug# continuous cement in 100 sack (583') intervals.

0 29I 576 50 60 64 64 15.6 14.5

50/50Poz Class

291

Plug#14 Plug#15

 σ

14.5 lb/gal. Slurry Weight (Ib./gal.) 15.5 Type of Cament, Soacar or Other Material Used IClass Δ Type of Preflush Usd Rring

DESCRIPTION OF PLUGGING PROCEDURE

Plugs 2 through 13

7574 to 576 feet

Use 50-50 Poz cement at

Estimated cost/well = \$22,000.00 Total cost for 8 wells = \$176,000.00

ESTIMATED COST OF PLUGGING AND ABANDONMENT

Cement £ Cast Iron Bridge Plug 8 Logging Cement Retainer £ Rig or Pulling Unit Miscellaneous \$

CERTIFICATION

I certify under the penalty of law that I have examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information. I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (Ref.40 CFR 144.32)

NAME AND OFFICIAL TITLE (Please type of print) Donald D. Metzger

SIGNATURE

DATE SIGNED 11-27-91

Suggested Format

SEPA

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY WASHINGTON, D.C. 20460

Wells drilled prior to 1986

PLUGGING AND ABANDONMENT PLAN

1985

WEL'. N	AME & NUMBER	FIELD NAME, LE	ASENAN	AE & NUN	ABER NA	ME. ADDRESS	. & PHONE!	O RABMUN	FOWNER/C	PERATOR
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7"	23	7800	7	800	8-3"	1180	Lite/Poz	T/ T	ne Two Plug N	
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I certify under the penalty of law that I have examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (Ref.40 CFR 144.32)

Name and Official TITLE (Please type or print)
Donald D. Metzger
Resident Manager

SIGNATURE COMPLETE

DATE SIGNED

11-27-91

			Page B-4 of 4			
ORIGINAL WELL CONSTRUCTION DURING OPERATION			PLUGGING AND ABANDONMENT CONSTRUCTION			
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<i>\$/\dV/}\\\\</i> }	VIVINIA DRIG	LED R 1985	29/ (ft.)	<i>M//N//N//</i>		AFTER 1985
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Cement(ft.) {///////	V/N/N//3		L.	*// <i>//////</i> ////////////////////////////	<u>{</u>	600 FT.
CEMENTED VIII	V///////// Surface	İ	u /	Y //X//X//X		Surfece Casing 900 (ft.)
BACK TO	Surface Casing 90	2_ (ft.)	# <i> 4</i> ・USDW Basa Plu		· ·	Casing 200 (tt.)
SURFACE E	\/ <i>N</i> / <i>A</i>		Interval	~ <i>\{\/\\</i> //\	(<i>//\//</i> {
<i>\(\lambda \l</i>	USDW		29/ (ft.) to 576	(ft.) {/////		N/A : 79
EA A	Base 6	∠ (ft.)		- <i>\$\\\\\</i>		USDW Base <u>672</u> (ft.)
V/X//\	\\/X// \			<i>\{\/\}\\\</i>	$\widetilde{\omega}$	/ <i>X</i> // \$
V/X//	<i>V/X/A</i>		* Intermediate	- V/N/A	`	Intermadiats
\{\/\/ \	<i>\(\lambda \l</i>		Cut/Rip Point Plu	ים <i>\/////</i>	1	Cut/Rip
<i>₹/</i> X/ <i>A</i>	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\		Interval	\$\/\X\/\A	ТНРО V БН VO V S	Depth (ft.)
Top Of Cament (ft.)	\(\lambda \lambda \lam		(ft.) to	.tu.je/////	9 V	LEFT IN HOLE
	\ <i>\/\\\\</i> }			- V/X///	7.0	CEMENTED TO SURFACE
CEMENTED WALL	<i>V/X</i> // <i>X</i>			\(\X\/\)	47	N/X
BACK TO	* Intermedi	ate		V// //	. 3	* intermadiate
SURFACE	Casing 543	(ft.)	#2 to #13		17.0	Casing 5450 (ft.)
₹ //}	· (2)		• Middle Plug Inte		2	/ X
Y/\lambda	<i>{</i> ∕} ·		576 (ft.) to 7574	(ft.) (//	00	()
V/A	\/ <u>/</u> }			<i>₩</i>	2	// }
<i>\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\</i>	<i>\(\lambda \)</i>				~	(/3
<i>\(\lambda \)</i>	√/} .		* Long String Cut/	Rio VII	7	/ / }
<i>V/</i> 1	(/ <u>)</u>		Point Plug Interva	si [///		* Long String Cut/Rip Dapth
\	[// }		(ft.) to	.(ft.) <i>{///</i>		(ft.)
₹//}	<i>V/</i> }			¥//	·	LEFT IN HOLE
Top Of	V/3			Y///	·	CEMENTED TO
Cement(ft.)	\{\begin{align*} \(\) \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\		Bottom Plug Dep		#1	SURFACE
CEMENTED	V/3		7 <u>780</u> (ft.) to <u>7574</u>	(ft.)	WWW.	// X
BACK TO SURFACE	Long Strin	g	* Mechanical Pluc	. — 🖄	#/////////////////////////////////////	Long String
Perforations: **	Casing 78	<u>oo</u> (ft.)	Depth <u>7800</u> (ft.)	· - {		Casing <u>7800</u> (ft.)
,, }	· ·			{		_
Hole Size 82 (in.)	• Dapth <u>β</u> δ	00 (ft.)				• Dapth <u>8000</u> (ft.)
	•					
** Add Any Additional Information	,		** Add Any Addit		nation	
*May Not Apply			* May Not Apply			
LIST OF ALL OPEN AND/	R PERFORATED INT	ERVAL	S AND INTERVA	ALS WHE	RE CASIN	G WILL BE VARIED
ecity Open Hole/Perforetions/Varied Casing	From		To		Formation	
					,	

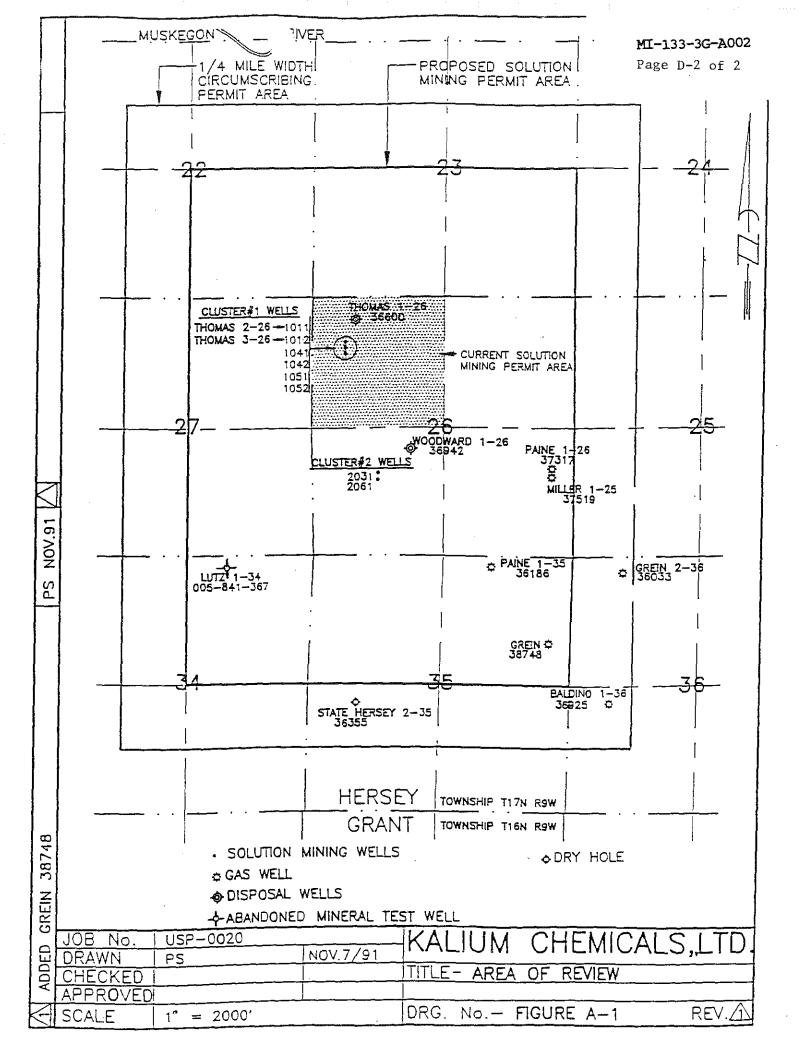
CORRECTIVE ACTION PLAN

No corrective action is required at this time

Names and Locations of Wells Authorized Under This Permit

Well Name	Surface Location
1. KCL 1011	SE/4-NW/4-NW/4 of section 26-T17N-R9W
2. KCL 1012	SE/4-NW/4-NW/4 of section 26-T17N-R9W
3. KCL 1041	SW/4-NW/4-NW/4 of section 26-T17N-R9W
4. KCL 1042	SW/4-NW/4-NW/4 of section 26-T17N-R9W
5. KCL 1051	SW/4-NW/4-NW/4 of section 26-T17N-R9W
6. KCL 1052	SW/4-NW/4-NW/4 of section 26-T17N-R9W
7. KCL 2031	W LINE-NE/4-SW/4 of section 26-T17N-R9W
8. KCL 2061	N/2-SW/4 of section 26-T17-R9W

The solution mining injection wells will be limited to the following area: The SE/4 of Section 22, The S/2 of Section 23, The E/2 of Section 27, All Section 26, The NE/4 of Section 34, The N/2 of Section 35, all in Township 17W, Range 9W.



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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 5 77 WEST JACKSON BOULEVARD CHICAGO, IL 60604-3590

FACT SHEET FOR ISSUANCE OF UNDERGROUND INJECTION CONTROL (UIC) CLASS III AREA PERMIT - SOLUTION MINING OF SALIT

REPLY TO THE ATTENTION OF:

Permit Number: MI-133-3G-A002

Project Name: <u>Hersey Potash Project</u>

Kalium Chemicals, Itd. of Rolling Meadows, Illinois, has applied to the United States Environmental Protection Agency (USEPA) for an area permit to construct and operate injection wells to be used for solution mining of potash in Osceola County, Michigan.

Review of the permit application indicates that no significant environmental impact should result from the proposed injection. The USEPA, therefore, intends to issue a permit for six existing and two proposed solution mining injection wells in an area limited to the SE/4 of section 22, the S/2 of section 23, the E/2 of section 27, all section 26, the NE/4 of section 34, the N/2 of section 35, all in Township 17N, Range 9W.

Under the authority of Title 40, Code of Federal Regulations (CFR) Parts 144 and 146, USEPA permits must specify conditions for construction, operation, monitoring, reporting, and plugging and abandonment of injection wells so as to prevent the movement of fluids into any underground sources of drinking water (USDW). General provisions for USEPA UIC permit requirements are found at 40 CFR Parts 144 and 146, while regulations specific to Michigan injection operations are found at 40 CFR Part 147 Subpart X. In accordance with 40 CFR 124.8, general information and highlighted permit conditions specific to these wells are as follows:

Area of Review (AOR) and Corrective Action: In accordance with 40 CFR 144.55, 146.6 and 146.7, this is the area in and around the permit area within which the applicant must research, examine and develop a program to address, with a corrective action plan, wells which penetrate the injection zone that are improperly sealed, completed or abandoned and may, therefore, provide a conduit for fluid migration. The applicant has provided documentation on the well population within 1/4 mile of the permit area (i.e., the AOR). There are eight solution mining, six producing, two injection, 0 temporarily abandoned and two plugged and abandoned wells within the area of review which penetrate the injection zone.

Facility Description: Kalium markets potash worldwide with the major percentage used as fertilizer and the balance in chemical and industrial applications. Kalium's mining process in Michigan involves pumping a solution through boreholes in potash beds 7500 feet below the surface, dissolving the potash-bearing portion of the ores and returning the solution to surface for refining. The solution is processed through a series of crystallizers where the potash crystals are formed. The crystals are then dried and sifted through a series of special screens to assure a consistent particle size. The mining operation produces some solution that is not of high enough

quality to be refined. This weaker solution is disposed into a porous limestone formation 4000 feet below surface. Kalium ships bulk potash via hopper trucks directly to customers or to offsite storage warehouses.

<u>Underground Sources of Drinking Water (USDWs)</u>: USDWs are defined by the UIC regulations as aquifers or portions thereof which contain less than 10,000 milligrams per liter of total dissolved solids and which are being or could be used as a source of drinking water. The base of the lowermost possible USDW in the vicinity of the injection wells has been identified at approximately 672 feet below ground surface. This water bearing formation is the Glacial Drift.

<u>Injection and Confining Zones</u>: Injection of fluids for solution mining of potash is limited by the permit to the A-1 Evaporite in the interval between 7479 and 7896 feet below ground surface. This injection zone is separated from the lowermost USDW by approximately 6807 feet of sedimentary rock strata.

Construction Requirements: Pursuant to 40 CFR 146.32, all new Class III wells shall be cased and cemented to prevent the migration of fluids into or between underground sources of drinking water (USDWs). The permittee shall not commence construction, including drilling and conversion of any well until a final permit has been issued. Pursuant to 40 CFR 144.52(a)(1), all existing wells shall demonstrate the absence of fluid movement behind the casing within five (5) months of the permit's effective date by running a noise, temperature or oxygen activation log. The operator will be required to repeat this test at least once every five (5) years, thereafter.

<u>Injection Fluid</u>: The injected fluid shall be restricted to those fluids listed in Page A2 of 2. The maximum daily volume of fluid to be injected will be limited to 17,857 barrels.

Maximum Injection Pressure: The maximum wellhead injection pressure shall be limited to 1823 pounds per square inch gauge (psig). This limitation will ensure that the pressure during injection does not initiate fractures in the confining zone adjacent to the lowermost USDW during injection operations. This in turn ensures that the injection pressure will not cause the movement of injection or formation fluids into a USDW as prohibited by 40 CFR 146.33(a)(1).

Monitoring and Reporting Requirements: In accordance with 40 CFR 144.54 and 146.33, the applicant will be responsible for observing and recording injection pressure semi-monthly and reporting this to the USEPA on a quarterly basis. The cumulative injected and produced volume shall be monitored daily and shall be reported quarterly. The specific gravity shall be monitored monthly and shall be reported quarterly. An analysis of the injected fluid must be submitted on a quarterly basis. In addition, the applicant is required to conduct and pass a two part mechanical integrity test (MIT) on each well in accordance with 40 CFR 146.8, within the compliance schedule established in the final issued permit. The applicant will be required to repeat the first part of MIT (i.e., absence of significant leaks in the

casing) and also the second part of MIT (i.e., the absence of fluid movement behind the casing) at least once every sixty (60) months from the last approved demonstration. These tests will provide USEPA with an evaluation of the integrity of the casing, as well as a determination of the absence or presence of fluid movement behind the casing.

Plugging and Abandonment: In accordance with 40 CFR 146.10 and 146.34(c), the permit includes a plugging and abandonment plan for environmentally protective well closure at the time of cessation of operations. Kalium Chemicals, Ltd. has demonstrated adequate financial responsibility to close, plug, and abandon this underground injection operation. Kalium Chemicals, Ltd. has provided Financial Statement Coverage as financial assurance for the Company's injection wells in the State of Michigan. This coverage must be updated on an annual basis.

Issuance and Effective Date of Permit: In accordance with 40 CFR 124.15, the permit will become effective immediately upon issuance if no public comments were received that requested a change in the draft permit. However, in the event that public comments are received and requesting a change in the draft permit, then the permit will become effective thirty (30) days after the date of issuance unless the permit is appealed. In accordance with 40 CFR 144.36(a), the permit will be in effect for the life of the operation unless it is otherwise modified, revoked and reissued, or terminated as provided at 40 CFR 144.39, 144.40 and 144.41. The permit will be reviewed by the USEPA at least once every five (5) years from its effective date for consistency with new or revised Federal regulations.

Questions, and requests for additional information or for a public hearing may be submitted in writing to the contact person listed below or made verbally to Patrick Saieh at (312) 886-4240. The public comment period on this permitting action will close thirty (30) days after the date of the public notice. If the USEPA receives written comments of substantial public interest that warrant a hearing on this action, a public notice of a scheduled hearing will be published locally and mailed to interested parties. In accordance with 40 CFR 124.19(a) any person who filed comments on the draft permit which preceded this final permit, or who participated in the public hearing, may petition the administrator to review any condition of this permit within 30 days of the service of notice of the Director's action, unless a later date is specified in that notice. Any person who failed to file comments, or failed to participate in the public hearing on the draft permit, may petition for administrative review only to the extent of the changes from the draft to the final permit decision.

The petition shall include a statement of the reason(s) supporting that review, including a demonstration that any issues being raised were raised during the public comment period, including any public hearing to the extent required by these regulations and when appropriate, a showing that the condition in question is based on: A finding of fact or conclusion of law which is clearly erroneous or an exercise of discretion or an important policy consideration which the Administrator should, in his or her discretion review.

The Administrator may also decide on his or her initiative to review any condition of this permit. He or she must act within 30 days of the service date of the Director's action. Within a reasonable time following the filing of the petition for review, the Administrator shall issue an order either granting or denying the petition for review. To the extent review is denied, the condition of the final permit decision becomes final agency action. A petition to the Administrator under 124.19(a), is a prerequisite to the seeking of judicial review of the final agency action. For purposes of judicial review, final agency action occurs when the final permit is issued or denied by EPA and agency review procedures are exhausted.

To preserve the right to appeal any final permit decision that may be made in this matter under 40 C.F.R. Part 124, you must either participate in the public hearing or send in written comments on the draft permit decision. This first appeal must be made to the Administrator; only after all agency review procedures have been exhausted may you file an action in the appropriate Circuit Court of Appeals for review.

U.S. Environmental Protection Agency Region V, (WD-17J) 77 W Jackson Blvd. Chicago, Illinois 60604

Attn: Richard J. Zdanowicz, Chief

Underground Injection Control Section

Richará J. Zdanowicz, Chief

Underground Injection Control Section

PERMIT UNIT CHIEF'S CONCURRENCE FORM

DOCUMENT SUBJECT 10 6	Hterd Camment	MAR 1 1 1992
Gerl	ad Public, Rolice	
fu k	alium Chemicale	•
Name	Initials	Date
Typist Redding	MER	2/25/92
Originator(s) Name(s)		
Oldrich Which	P.S.	2/25/92
		·, ·
Reviewer(s) David Werbach	Ble	2/25
Allen Melcer	+ 11	ata
Unit Secretary -Kellye	- H	2/25
Unit Chief-Becky Harvey	RUIT	2/20
SPECIAL INSTRUCTIONS (IF	ANY)	

CLASS III UNL REGROUND INJECTION CONTROL PERMINE FINAL PERMIT FOR SIGNATURE

Permittee: KALIUM CHEMICALS, Ltd.	UIC Permit No: MI-133-3G-A003
City/State: Rolling MEA Bows, Illinois	County: <u>OSCEOLA</u> Well: <u>HERSEY POTASH PROJECT</u>
	WELLS MENSEY TOTASA TROSECT
End of 30 Day Comment Period 4/10/	92
A. No Comments received	No. also Consumer Con
B. No Changes to the Draft Permit	
C. Comments Received - LETTERS ENclose))
	· · · · · · · · · · · · · · · · · · ·
1. Significant	
2. Non-Significant	
D. Changes made to the Draft Permit	
Do Calley Co and Diale I called	**************************************
Pages Change(s) Made	
1	
2	
3	
E. No Change(s): Final Permit Concurrence	ce
Dama.	11/12/2
Unit Chernit Writer PATRICK S	Date: 4/13/92
to chist reside United or Or 113/5 to Gardenall	a Joseph Moragin Date: 3/15/92
4. SDW Branch Chief/Secy	Date: 4/15
5. Permit Administrator	
6. Deputy Water Div. Dir.	
7. Water Div. Director	Date: 4/20/92
F. Changes: Final Permit Concurrence	
1. Permit Writer	Date:
2. Permit Team Leader	
3. Enforcement Coordinator	
4. Permit Unit Chief	Dotos
5. UIC Section Chief	Date:
6. SDW Branch Chief	Date:
7. Permit Administrator	Date:
8. Deputy Water Div. Dir.	Date:
9. Water Div. Director	Date:
10. Permit Administrator	
Action Required	
* Water Div. Director: Please sign both	original cover pages (two provided)
	any letter by WD Director?
(If yes, please k	eep with permit)
IIIC. Form Letter	Tyming/Hold file?
TOPM or 1	Typing/inite life.
UIC: Form Letter	cc EEI 4/30/92 RecGreenCard 4/23/92

CLASS III UNDERGROUND INJECTION CONTROL PERMIT DRAFT PERMIT FOR SIGNATURE

	6. UIC Permit No: MI-133-3G-A002
city/State: Rolling MEADOWS, Illi	Nois County: OSCEOLA
	Well: HERSEY POTASH PROJECT
. Permit Writer: PATRICK SAIEH	Date: 1/2/16/91
2. Permit Team Leader:	Date: /2/(7/9/
B. Enforcement Coordinator: Chunc	The contract of the contract o
4. Permit Unit Chief Round Harry	Secy Ku Date: 12 19 9
5. UIC Section Chieffa John C.	Taylor Date: 12/19/91
6. Permit Administrator M. G. Key	lding Date: 12/30/91
COMMENTS - Specify page and Section	
Permit U	Init Tracking
Draft Mail / cc: IDEM or D Transmittal Co. 18/30/9/ with copy /6	
Public Notice JAN 29 1992	Mailed 1/29/92
	11 /1 , 4/4 / 50
Repository Mailed REEd City Pu	16/1c hibrary 12/30/91/
Copies made 3	lished in the CADITAC NEW
	lished in the CAdillAC New. 1/29/92
Area of Review Typed	/ Mailed //29/92



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 5 77 WEST JACKSON BOULEVARD CHICAGO, IL 60604-3590

Page 1 of 17
UNDERGROUND INJECTION CONTROL MINOR PERMIT MODIFICATION:

CLASS III AREA PERMIT

Permit Number: MI-133-3G-A002

Project Name: <u>Hersey Potash Project</u>

Pursuant to the provisions of the Safe Drinking Water Act, as amended (42 U.S.C. 300f et seq., commonly known as the SDWA) and implementing regulations promulgated by the United States Environmental Protection Agency (USEPA) at Parts 124, 144, 146 and 147 of Title 40 Code of Federal Regulations (CFR), Kalium chemicals, Ltd. of Rolling Meadows, Illinois is authorized to operate eleven existing solution mining injection wells located in Michigan, Osceola County, in a permit area limited to that described in Part III(D) of this permit. Injection shall be limited to the Salina Group between 5765 and 7896 feet, upon the express condition that the permittee meet the restrictions set forth herein. The names and locations of wells authorized under this permit and a map of the permit area are provided in Part III(D) of this permit. Injection shall not commence into any newly drilled or converted well until the operator has received authorization in accordance with Part I(E) (11) of this permit. Additional injection wells may be constructed and operated within the permit area provided that the permittee notifies the Director prior to construction and all permit requirements are

All references to 40 Code of Federal Regulations are to all regulations that are in effect on the date that this permit is effective.

This permit is a minor permit modification of an existing area permit which was signed on April 15, 1992, and shall remain in full force and effect during the operating life of the field, unless this permit is otherwise revoked, terminated, modified or reissued pursuant to 40 CFR 144.39 or 144.40 and 144.41. This permit shall also remain in effect upon delegation of primary enforcement responsibility to the State of Michigan unless that State chooses to adopt this permit as a State permit. This permit will be reviewed at least every five (5) years from the effective date specified above.

Signed and date: December 15, 1993

Dale S. Bryson

Director, Water Division

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 5 77 WEST JACKSON BOULEVARD CHICAGO, IL 60604-3590

Page 1 of 17 REPLY TO THE ATTENTION OF: UNDERGROUND INJECTION CONTROL CLASS III AREA PERMIT

Permit Number: MI-133-3G-A002

Project Name: <u>Hersey Potash Project</u>

Pursuant to the provisions of the Safe Drinking Water Act, as amended (42 U.S.C. 300f et seq., commonly known as the SDWA) and implementing regulations promulgated by the United States Environmental Protection Agency (USEPA) at Parts 124, 144, 146 and 147 of Title 40 of the Code of Federal Regulations (CFR), Kalium Chemicals, Ltd. of Rolling Meadows, Illinois is authorized to operate six existing and two proposed solution mining injection wells located in Michigan, Osceola County, in a permit area limited to that described in Part III(D) of this permit. Injection shall be limited to the A-1 Evaporite between 7479 and 7896 feet, upon the express condition that the permittee meet the restrictions set forth herein. The names and locations of wells authorized under this permit and a map of the permit area are provided in Part III(D) of this permit. Injection shall not commence into any newly drilled or converted well until the operator has received authorization in accordance with Part I(E)(11) of this permit. Additional injection wells may be constructed and operated within the permit area provided that the permittee notifies the Director prior to construction and all permit requirements are met.

All references to 40 Code of Federal Regulations are to all regulations that are in effect on the date that this permit is effective.

This permit shall become effective on WAY 15 1992 and shall remain in full force and effect during the operating life of the field, unless this permit is otherwise revoked, terminated, modified or reissued pursuant to 40 CFR 144.39, 144.40 and 144.41. This permit shall also remain in effect upon delegation of primary enforcement responsibility to the State of Michigan unless that State chooses to adopt this permit as a State permit. This permit will be reviewed at least every five (5) years from the effective date specified above.

Signed and dated:

Dale S. Bryson

Director, Water Division

OPERATING, MONITORING AND REPORTING REQUIREMENTS

LIMITATION

MINIMUM
MONITORING REQ.

MINIMUM REPORTING REQUIREMENTS

Characteristic

Freq. Type

*Injection Pressure 1402 psig (MAXIMUM) semi-monthly quarterly

Cumulative Injected Volume daily quarterly

Cumulative Produced Volume daily quarterly

Specific Gravity monthly grab quarterly

**Chemical Composition of Injected Fluid quarterly grab quarterly

SAMPLING LOCATION: The sampling location shall be at each injection pump discharge before the manifold system.

*The limitation on wellhead pressure serves to prevent confining-formation fracturing. This limitation was calculated using the following formula: [{0.8 psi/ft - (0.433 psi/ft)(specific gravity)} x depth] - 14.7 psi}]. The maximum wellhead pressure is dependent upon depth and specific gravity of the injected fluid. The Salina Group at 5765 feet was used as the depth and a specific gravity of 1.28 was used for the injected fluid.

**Chemical composition analysis shall include, but not be limited to, the following: Sodium, Calcium, Barium, Magnesium, Total Iron, Chloride, Sulfate, Carbonate, Bicarbonate, Sulfide, Total Dissolved Solids, pH, Resistivity (ohm-meters @ 75°F), and Specific Gravity.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 5 77 WEST JACKSON BOULEVARD CHICAGO, IL 60604-3590

Page 1 of 17 REPLY TO THE ATTENTION OF: UNDERGROUND INJECTION CONTROL CLASS III AREA PERMIT

Permit Number: MI-133-3G-A002

Project Name: <u>Hersey Potash Project</u>

Pursuant to the provisions of the Safe Drinking Water Act, as amended (42 U.S.C. 300f et seq., commonly known as the SDWA) and implementing regulations promulgated by the United States Environmental Protection Agency (USEPA) at Parts 124, 144, 146 and 147 of Title 40 of the Code of Federal Regulations (CFR), Kalium Chemicals, Ltd. of Rolling Meadows, Illinois is authorized to operate six existing and two proposed solution mining injection wells located in Michigan, Osceola County, in a permit area limited to that described in Part III(D) of this permit. Injection shall be limited to the A-1 Evaporite between 7479 and 7896 feet, upon the express condition that the permittee meet the restrictions set forth herein. The names and locations of wells authorized under this permit and a map of the permit area are provided in Part III(D) of this permit. Injection shall not commence into any newly drilled or converted well until the operator has received authorization in accordance with Part I(E)(11) of this permit. Additional injection wells may be constructed and operated within the permit area provided that the permittee notifies the Director prior to construction and all permit requirements are met.

All references to 40 Code of Federal Regulations are to all regulations that are in effect on the date that this permit is effective.

This permit shall become effective on ______ and shall remain in full force and effect during the operating life of the field, unless this permit is otherwise revoked, terminated, modified or reissued pursuant to 40 CFR 144.39, 144.40 and 144.41. This permit shall also remain in effect upon delegation of primary enforcement responsibility to the State of Michigan unless that State chooses to adopt this permit as a State permit. This permit will be reviewed at least every five (5) years from the effective date specified above.

Signed and dated:	(Sec
	DRAFT
e	Dale S. Bryson Director, Water Division

-VENTORY INFORMATION SHEET

STATE PERMIT NUMBER MIS - 39/- 934-767

OWNERSHIP DATA UIC PERMIT NUMBER MI-	
WELL INFORMATION	OPERATOR
WELL HAME WELL # 1044	NAME KALIUM CHEMICALS, Ltd.
LAT.	STREET 11461 SOUTH 135 HAVENUE
CITY/ST/ZIP	CITY/ST/ZIP <u>HERSEY, MI 49</u> 639 PHONE (C/C) 832-3755
PROJECT/FIELD/UNIT HERSEY POTASA	4
TOWNSHIP / 7/1. RANGE / 7/1. SECTION 26, 0	TR SECTION NW NW SW COUNTY OSCEOLA
1274 FEET FROM THE N LINE AND	
650 FEET FROM THE W LINE	
DATA WELL STATUS 1.UNDER CONST.	2. ACTIVE3.TEMP. ABAND.
4.PLUGGED5.ANN	ULAR
SURFACE ELEVATION IS 1145 FEET G. C	
WELL CLASS/TYPE 36 *	TOTAL DEPTH IS 8050 FEET
DRILLED ON (DATE) 1/28/93	PLUGGED BACK TO NA FEET
CONVERTED ON	ABANDONED ON NA (DATE)
SIZE SURFACE INTERMEDIATE PRODUCTION TUBING SIZE N.A DEPTH OF PACKER IS NA FEET	DEPTH CEMENT SACKS BORE SIZE 822 FEET 480/200 LITE/c/ASSA 171/2 5300 FEET 1650/400 LITE/c/ASSA 121/4 7934 FEET 420 PRENIUM 81/2
[INJECTION DATA]	OFF FROM RAIN FALL, RECYCLED SOLUTION FROM REFINER;
INJECTION FLUID IS BOILER BLOW DOWN	I FWID, FACILITY PURGE & FLUSH WATER
INJECTION VOLUME IS # 17,85	
**WELL HEAD INJECTION PRESSURE IS	
INJECTION INTERVAL 1 IS FROM <u>5765</u> F	
FORMATION IS SALINA C	•
INJECTION INTERVAL 2 IS FROM	
FORMATION IS	

DECOVERY THIETTION WELLS. ATTACH DATA ON

MYENTORY INFORMATION SHEET

STATE PERMIT NUMBER MIS - 387-934-767

OWNERSHIP DATA UIC PERMIT NUMBER M	I-133-3G-A002
WELL INFORMATION	OPERATOR
WELL NAME WELL # 1054	HAME KAlium CHEMICALS Ltd
LAT.	STREET 1/46 / S. 135 th STREET AVE
CITY/ST/ZIP	CITY/ST/ZIP HERSEY MI 49639
	PHONE (616) 832-3755
PROJECT/FIELD/UNIT <u>HERSEY POTASA</u>	,
	, OTR SECTION NW NWSW COUNTY OSCEOLA
//89 FEET FROM THE N LINE AND)
650 FEET FROM THE W LINE	
LL DATAL WELL STATUS 1. UNDER CONS	T2. ACTIVE3.TEMP. ABANO.
4.PLUGGED5.	.ANNULAR
SURFACE ELEVATION IS FEET	
WELL CLASS/TYPE 36 *	TOTAL DEPTH IS 7900 FEET
DRILLED ON (DATE) $8/2/93$	PLUGGED BACK TO NA FEET
CONVERTED ON NA	ABANDONED ON (DATE)
TUBING CASING	BEBTU CONCUT CLOVE DODE CATE
SIZE SURFACE INTERMEDIATE 9.578 INCHES PRODUCTION 7.00 INCHES TUBING SIZE M.4 INCHES DEPTH DF PACKER IS M/A FEET	DEPTH CEMENT SACKS BORE SIZE 825 FEET 680 17/2 5309 FEET 1625 121/4 7845 FEET 635 81/2
[INJECTION DATA]	
	DECYCLED SOLUTION
INJECTION VOLUME IS TRESH WATEN	RUN-OFF FROM RAIN FALL, RECYCLED SOLUTION FROM REFINERY BOILER BLOW DOWN Fluid, FACIL BLOW BLOW DE WISH WATER
	
**WELL HEAD INJECTION PRESSURE IS	
INJECTION INTERVAL 1 IS FROM 280	 ,
FORMATION IS A-/	VAPORITE
INJECTION INTERVAL 2 IS FROM	
FORMATION IS	· ·
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** IF YOU OPERATE CLASS II ENHANCED DIL RECOVERY INJECTION WELLS, ATTACH DATA ON

PURPOSE OF PUBLIC NOTICE

The United States Environmental Protection Agency (USEPA) is extending the public comment period from February 29, 1992 to March 29, 1992, concerning a proposal to inject fluids underground via Class III solution mining wells. The purpose of the extension is to provide additional opportunity for written public comments concerning this area permit.

BACKGROUND

Part C of the Safe Drinking Water Act (SDWA) specifically mandates regulation of the underground injection of fluids through wells to assure that the quality of underground sources of drinking water is protected. Section 1421 of the SDWA requires USEPA to administer Underground Injection Control (UIC) program in states which do not have approved UIC programs. Michigan has not acquired primacy over the UIC program, therefore USEPA is administering the permit program pursuant to regulations at 40 C.F.R. Part 147. As indicated below, the owner has permission of, or has applied for permission to the Michigan Department of Natural Resources (MDNR) pursuant to R299.2211 of the Mineral Well Act, Act No. 315 of the Public Acts of 1969 and also to the USEPA for an area permit pursuant to the USEPA regulations at 40 C.F.R. Part 144.

Six existing and Two proposed injection wells for solution mining of potash are owned and operated by Kalium Chemicals, Ltd. of Rolling Meadows, Illinois

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Osceola County: Hersey Potash Facility:
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EPA Area Permit #MI-133-3G-A002 (KCL #1011, MDNR Permit #348-845-767)
(KCL #1012, MDNR Permit #347-845-767)
(KCL #1041, MDNR Permit #366-904-767)
(KCL #1042, MDNR Permit #048-855-567)
(KCL #1051, MDNR Permit #016-855-567)
(KCL #1052, MDNR Permit #010-855-567)
(KCL #2031, MDNR Permit Applied For)
(KCL #2061, MDNR Permit Applied For)
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Permit Writer: Patrick Saieh (312) 886-4240

A copy of the draft area permit is available for viewing at: Reed City Public Library, 410 West Upton, Reed City, Michigan; Monday-Wednesday-Thursday 12 p.m. to 5 p.m., Tuesday 12 p.m. to 8 p.m., Friday 9 a.m. to 5 p.m. and Saturday 10 a.m. to 2 p.m.

APPEAL

To preserve your right to appeal any final permit decision that may be made in this matter under 40 C.F.R. Part 124 you must either participate in the public hearing or send in written comments on the draft permit decision. The first appeal must be made to the Administrator; only after all agency review procedures have been exhausted may you file an action in the appropriate Circuit Court of Appeals for review.

PUBLIC COMMENTS

If significant written comments are received within 30 days of the date of this notice, a public hearing may be scheduled. If a public hearing is scheduled a notice of the hearing will be published at least 30 days in advance. Written comments will be accepted at the address listed below. All data submitted by the applicant for this permit action is part of the administrative record and is available for review between 9 a.m. to 4 p.m. at the address listed below. It is recommended that you telephone the listed Permit Writer before visiting the Region V office, or for information on the notice:

U.S. Environmental Protection Agency UIC Section (Attn: Richard J. Zdanowicz, Chief) 77 West Jackson Boulevard (WD-17J) Chicago, Illinois 60604-3590

WD-17J:P.Saieh:mr:2/25/92

1597 P.S.2/25/92

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APR 2 3 1992

<u>CERTIFIED MAIL</u> P **874 011** 129 RETURN RECEIPT REQUESTED

Mr. Kenneth F. Ford Registered Forester Wildlife Manager Lake States Forestry Consultants 11805 South 120th Street Hersey, Michigan 49639

Re: Public Comments on United States Environmental Protection Agency (USEPA) Final Area Permit #MI-133-3G-A002.

Dear Mr. Ford:

Thank you for your letter of April 9, 1992, regarding the above-referenced final area permit.

As I stated in my letter of March 11, 1992, the purpose of the Underground Injection Control (UIC) program is to prevent contamination of Underground Sources of Drinking Water (USDWs) by regulating the construction and operation of injection wells. In your letter, you have requested that Kalium Chemicals, Ltd. be required to recycle their injected water. Please be advised that there are no provisions under the Safe Drinking Water Act (SDWA) which allows the USEPA to require owners/operators of Class III injection wells to recycle their injection water as you have requested. Since all of the concerns you have raised are related to fresh water wells, which comes under the purview of the Michigan Department of Public Health; we feel that perhaps your questions will be more fully addressed by contacting Mr. Mike Ulrich, Osceola County Department of Public Health, 115 N. Sears, Reed City, Michigan 49677.

If you have any further questions, please contact Patrick Saieh of my staff at (312) 886-4240.

Sincerely yours,

Richard J. Zdanowicz, Chief Underground Injection Control Section

WD-17J:P.Saieh:fh:4/15/92

Patrick's Disk #9 Document Name: Kenn

UIC CONTROL #43

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3. Article Addressed to: Mr. Kenneth F. Ford Registered Forester Wildlife Manager Lake States Forestry Consultants 11805 South 120th Street Hersey, Michigan 49639	4. Article Number P 874 011 129 Type of Service: Registered Insured COD Express Mail Return Receipt for Merchandise Always obtain signature of addressee or agent and DATE DELIVERED.	
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Dairrick Sareh LAKE STATES

FORESTRY CONSULTANTS

11805 South 120th Ave. Hersey, Michigan 49639 (616) 734-2841

RECEIVED

4/9/92

APR 1 5 1992

Mr. Richard D. Zdanowicz, Chief U.I.C.S. USEPA Region 5 77 West Jackson Blvd. Chicago, IL 60604

LUC SECTION EFA - REGION V

RE: EPA Draft Area Permit #MI-133-3G-A002

Dear Mr. Zdanowicz.

When the Kalium Chemical Potash Project first applied for injection well permits in 1985, I was led to believe that only a small amount of water would be required to mine the potash. The salts would be evaporated and the water would be re-used for mining. Kalium manager Donald Metzger stated he had a market for the NaCl which forms a substantial portion of the solution fluid.

Given the fact that no such market exists. Kalium has had to inject the NaCl as waste into its disposal wells.

This of course greatly increases the amount of fresh potable water required.

All projections of fresh water usage were based on a recycling of the original makeup water in the solution mining process.

I would like to know: how much potable water is being drained out of the aquafer and eliminated from the hydrological cycle forever?

I would like to know if the EPA has ever considered evaluating the net worth of all the potable water that is being lost in this project. Given the widespread contamination of this nation's groundwater, is it not conceivable that the potable water being consumed by this project is more valuable than the potash being mined?

KENNETH F. FORD

Registered Forester & Wildlife Manager

Zdanowicz Page 2 4/8/92

I believe Kalium knew from the start that there was no market for the NaCl byproduct and therefore deceived all interested parties by claiming their water usage would be minimal because they would recycle their mined up water.

They made this claim to avoid concern over large scale drawdown of the aquafer.

I would urge you to not issue any further permits to Kalium until they begin marketing their NaCl and recycling their water, as they led all interested parties to believe.

Sincerely,

Kenneth F. Ford

LAKE STATES due 3-11-92 FORESTRY CONSULTANTS

11805 South 120th Ave. Hersey, Michigan 49639 (616) 734-2841

2-21-92

Mr. Richard J. Zdanowicz Chief, U.I.C. Section EPA Region 5 77 W. Jackson BLVD. Chicago, IL 60604-3590

Re: Kalium Chemical, Ltd. Injection Well Permit. Permit Number: MI-133-3G-A002

Dear Mr. Zdanowicz,

It was recently brought to my attention that The EPA was soliciting public comments on a proposed permit for new injection wells for Kalium Chemicals.

However, when I went to the Reed City Public Library to review the Permit Application, I discovered that there was nothing there to review and that, further, the Librarian knew nothing about said Permit Application.

I then checked with our County paper, The Osceola County Herald, and they informed me that they did not publish any information regarding this matter.

As of this writing, the above Permit, MI-133-3G-A002 is still not in our library.

I would like to review this information and submit written comments if appropriate. Therefore, please either send me a copy of the Permit Application or inform me where I can review this document.

KENNETH F. FORD

Registered Forester & Wildlife Manager

In the meantime, I trust that your Section will not act on this request until adequate time has been allowed for public comment.

I will await to hear from you.

Sincerely,

Jineerer,

Junt A. Mors

P. 559 848 321

RECEIPT FOR CERTIFIED MAIL NO INSURANCE COVERAGE PROVIDED

	NOT FOR INTERNATIONAL MAILUIC mr (See Reverse)
	Sent Mr. Kerneth F. Ford Street and Street Forester Wildlife Manager P.O. Stake States Forestry Consult. 11805 South 120th Street Postagersey, Michigan 49639 2 Certified Fee
	Special Delivery Fee Restricted Delivery Fee
1985	Return Receipt showing to whom and Date Delivered Return Receipt showing to whom. Date, and Address of Delivered.
Form 3800, June 1985	Date, and Address of Delivery TOTAL Postage and Fees \$3.2
PS Form 38	Ur Date

SENDER: Complete items 1 and 2 when additional s 3 and 4. Put your address in the "RETURN TO" Space on the reverse s from being returned to you. The return receipt fee will provide the date of delivery. For additional fees the following services and check box(es) for additional service(s) requested. 1. Show to whom delivered, date, and addressee's additional fees the following services and check box(es) for additional service(s) requested.	you the name of the person delivered to and are available. Consult postmaster for fees dress. 2. Restricted Delivery (Extra charge)
3. Article Addressed to: Mr. Kenneth F. Ford Registered Forester Wildlife Manager Lake States Forestry Consultants 11805 South 120th Street Hersey, Michigan 49639	4. Article Number P 559 848 321 Type of Service: Registered COD Express Mail Return Receipt for Merchandise Always obtain signature of addressee or agent and DATE DELIVERED.
5. Signature - Addressee X 6. Signature - Agent X 7. Date of Delivery 3-16-92	8. Addresse's Address (ONLY if requested and fee paid) DOMESTIC RETURN RECEIPTED DOMESTIC RETURN RETURN RECEIPTED DOMESTIC RETURN RETURN RECEIPTED DOMESTIC RETURN RETURN RETURN RETURN RECEIPTED DOMESTIC RETURN RET



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY REGION 5 77 WEST JACKSON BOULEVARD CHICAGO, IL 60604-3590

*

REPLY TO THE ATTENTION OF:

March 11, 1992

WD-17J

CERTIFIED MAIL P 559 848 321
RETURN RECEIPT REQUESTED

Mr. Kenneth F. Ford Registered Forester Wildlife Manager Lake States Forestry Consultants 11805 South 120th Street Hersey, Michigan 49639

Re: Public Comments on Environmental Protection Agency Draft Area Permit #MI-133-3G-A002

Dear Mr. Ford:

Thank you for your letter of February 21, 1992, regarding the above-referenced draft area permit.

The scope of the Federal Underground Injection Control (UIC) regulations is to determine the soundness of siting, construction and operation of injection wells as they relate to the protection of underground sources of drinking water (USDWs). A USDW is an aquifer or its portion which contains less than 10,000 mg/l of total dissolved solids. In this case, all six existing and both proposed injection wells are adequately cemented to preclude the movement of fluids into or between USDWs due to injection operations. In addition, every injection well is required to demonstrate a two part Mechanical Integrity Test (MIT). The first part of MIT requires the permittee to demonstrate the absence of significant leaks in the casing, tubing and packer. This test is accomplished by setting a temporary rubber packer above the injection zone, between the tubing and production casing. The space between the tubing and casing is pressurized for at least 30 minutes with no more than 3% pressure drop in order to satisfy the first part of Mechanical Integrity (MI). The second part of the MI requires the permittee to demonstrate the absence of fluids movement into and between USDWs by using one of the following methods; temperature, noise or oxygen activation log. A descriptive report interpreting the results of such logs shall be prepared by a knowledgeable log analyst and submitted to our office for review. The permittee will also be required to demonstrate both parts of MI every 5 years from the last approved demonstration. Under permit conditions, the injection pressure will be limited to ensure the safe operation of the wells and quarterly reports of pressures, cumulative and produced volumes will be submitted to our office for review.

In your letter you stated that a copy of the draft area permit was not available for viewing at the Reed City Public Library, Mary Redding of my staff contacted the library on February 25, 1992, and spoke with a library representative who stated that they never received the copy of the draft area permit that we sent to them. We apologize for any inconvenience we may have caused you concerning this matter.

With regard to your question that the notice was not published in the Osceola County Herald, whenever a proposed permit action involves an area which encompassed a large population within the boundaries of the area and the surrounding quarter 1/4 mile, the United States Environmental Protection Agency (USEPA) attempts to publish the notice in a newspaper or newspapers whose circulation covers the area of concern. In this case, the circulation of the Cadillac Evening News covered the entire area of concern and was the most effective way to notify the public.

Based on the circumstances, we have extended the public comment period to April 9, 1992, to allow you the opportunity to raise any additional comments you may have. As of February 27, 1992, a copy of the draft area permit has been available for viewing at the Reed City Public Library. In addition, we will also publish the notice in the Osceola County Herald. If you wish to review the permit application, please submit a request under the Freedom of Information Act (FOIA). You may submit a (FOIA) request under the Section 5 U.S.C. §522, and the Privacy Act of 1974 (PA) §522(a) (enclosed). All information you request will be copied and forwarded to you in a timely manner.

In accordance with 40 Code of Federal Regulations (C.F.R.) Section 124.19, any person who files comment on the draft permit may petition the USEPA to review any condition of the final permit decision, within thirty (30) days of the service of notice of the final decision. If you wish to request an administrative review, you must submit such a request to the Office of the Administrator, Attention: Ronald L. McCallum, Chief Judicial Officer, A-101, USEPA, 401 M Street, S.W., Washington, D.C. 20460, within thirty-three (33) days of receipt of this letter. The request will be timely if received within this time period. For the request to be valid, it must conform to the requirements of 40 C.F.R. Section 124.19. A copy of these requirements is enclosed.

If you have any further questions, please contact Patrick Saieh of my staff at (312) 886-4240.

Sincerely yours,

Richard J. Zdanowicz, Chief

Underground Injection Control Section

Enclosures

cc: R. Thomas Segall, Michigan Department of Natural Resources Charles Brown, The Cadmus Group UIC Control #7 WD-17J:P.Saieh:mr:3/4/92

P. S. 3/6/92

men 3/6/92

B 3PP 550 449

RECEIPT FOR CERTIFIED MAIL NO INSURANCE COVERAGE PROVIDED Mr. Kenneth F. Ford Registered Dorester Wildlife Manager Lake States Forestry Consultants 11805 South 120th Street Hersey, MI 49639 Postage Certified Fee 1.00 Special Delivery Fee Restricted Delivery Fee Return Receipt showing to whom and Date Delivered .00 Return Receipt showing to whom Date, and Address of Delivery TOTAL Postage and Fees PS Form 3800, Postmark or Date

SENDER: Complete items 1 and 2 when additional 3 and 4. Put your address in the "RETURN TO" Space on the reverse from being returned to you. The return receipt fee will provide the date of delivery. For additional fees the following services and check box(es) for additional service(s) requested. 1. Show to whom delivered, date, and addressee's ad (Extra charge)	services are desired, and complete items side. Failure to do this will prevent this card you the name of the person delivered to and s are available. Consult postmaster for fees dress. 2. Restricted Delivery (Extra charge)
Mr. Kenneth F. Ford Registered Forester Wildlife Manager Lake States Forestry Consultants 11805 South 120th Street Hersey, MI 49639	Type of Service: Registered Insured Certified COD Express Mail Return Receipt for Merchandise Aiways obtain signature of addressee or agent and DATE DELIVERED.
5. Signature — Addressee X 6. Signature — Agent X 7. Date of Delivery 4-22-95	8. Addressee's Address (ONLY if requested and fee paid)
PS Form 3811, Apr. 1989 *U.S.G.P.O. 1989-238-815	DOMESTIC RETURN RECEIPT

APR 2 0 1992

CERTIFIED MAIL P 366 220 448 RETURN RECEIPT REQUESTED

Mr. Kenneth F. Ford Registered Forester Wildlife Manager Lake States Forestry Consultants 11805 South 120th Street Hersey, Michigan 49639

Underground Injection Control (UIC) Permit #MI-133-3G-A002 (Hersey Potash Facility).

Dear Mr. Ford:

This letter is to inform you that the UIC Section of the United States Environmental Protection Agency has issued a final permit to Kalium Chemicals, Ltd. for the above-referenced facility. Should you wish to appeal this final permit decision, you must follow the procedures outlined in the letter which was sent to you on March 11, 1992.

Should you have any questions, feel free to contact me at (312) 886-4240. Sincerely yours, RH4/16/92

Patrick Saieh, Permit Writer Permit Unit, UIC Section

WD-17J:P.Saieh:fh:4/15/92

Patrick's Disk #9 Document Name: Ford

P.S. 4/15/92

P 366 220 449 RECEIPT FOR CERTIFIED MAIL NO INSURANCE COVERAGE PROVIDED NOT FOR INTERNATIONAL MAIL (See Reverse)

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	· A	Mr. Marco S. Menezes Attorney at Law P.O. Box 289 Hersey, MI 49639	Type of Service: Registered Insured Certified COD Express Mail Return Receipt for Merchandise Always obtain signature of addressee or agent and DATE DELIVERED.	
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WD-17J

APR 2 0 1992

CERTIFIED MAIL P 366 220 449 RETURN RECEIPT REQUESTED

Mr. Marco S. Menezes Attorney at Law P.O. Box 289 Hersey, Michigan 49639

Underground Injection Control (UIC) Permit #MI-133-3G-A002 (Hersey Potash Facility).

Dear Mr. Menezes:

This letter is to inform you that the UIC Section of the United States Environmental Protection Agency has issued a final permit to Kalium Chemicals, Ltd. for the above-referenced facility. Should you wish to appeal this final permit decision, you must follow the procedures outlined in the letter which was sent to you on March 10, 1992.

Should you have any questions, feel free to contact me at (312) 886-4240. Sincerely yours,

Patrick Saieh, Permit Writer Permit Unit, UIC Section

WD-17J:P.Saieh:fh:4/15/92

Patrick's Disk #9 Document Name: Menezes

P.S. 4/15/92

P 366 220 450 RECEIPT FOR CERTIFIED MAIL NO INSURANCE COVERAGE PROVIDED NOT FOR INTERNATIONAL MAIL

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WD-17J

APR 2 0 1992

CERTIFIED MAIL P 366 220 450 RETURN RECEIPT REQUESTED

Mr. David A. Jacobs Science Department Chair Evart High School 321 North Hemlock Evart, Michigan 49631

Underground Injection Control (UIC) Permit #MI-133-3G-A002 (Hersey Potash Facility).

Dear Mr. Jacobs:

This letter is to inform you that the UIC Section of the United States Environmental Protection Agency has issued a final permit to Kalium Chemicals, Ltd. for the above-referenced facility. Should you wish to appeal this final permit decision, you must follow the procedures outlined in the letter which was sent to you on March 10, 1992.

Should you have any questions, feel free to contact me at (312) 886-4240. Sincerely yours,

Patrick Saieh, Permit Writer Permit Unit, UIC Section

WD-17J:P.Saieh:fh:4/15/92

Patrick's Disk #9 Document Name: Jacobs

P.S.4/15/92 FH 15/92

RUH 16/97

P 366 220 451

RECEIPT FOR CERTIFIED MAIL

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(See Reverse)

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WD-17J

APR 2 0 1992

CERTIFIED MAIL P 366 220 451 RETURN RECEIPT REQUESTED

Mr. Rich Jacobs 5393 West Two Mile Road Hersey, Michigan 49639

Re: Underground Injection Control (UIC) Permit #MI-133-3G-A002 (Hersey Potash Facility).

Dear Mr. Jacobs:

This letter is to inform you that the UIC Section of the United States Environmental Protection Agency has issued a final permit to Kalium Chemicals, Ltd. for the above-referenced facility. Should you wish to appeal this final permit decision, you must follow the procedures outlined in the letter which was sent to you on March 10, 1992.

Should you have any questions, feel free to contact me at (312) 886-4240. Sincerely yours,

Patrick Saieh, Permit Writer Permit Unit, UIC Section

WD-17J:P.Saieh:fh:4/15/92

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WD-17J

APR 2 0 1992

<u>CERTIFIED MAIL</u> P 874 011 127 <u>RETURN RECEIPT REQUESTED</u>

Ms. Debra Bloom Vance 4632 Hersey Road Hersey, Michigan 49639

Re: Underground Injection Control (UIC) Permit #MI-133-3G-A002 (Hersey Potash Facility).

Dear Ms. Vance:

This letter is to inform you that the UTC Section of the United States Environmental Protection Agency has issued a final permit to Kalium Chemicals, Ltd. for the above-referenced facility. Should you wish to appeal this final permit decision, you must follow the procedures outlined in the letter which was sent to you on March 10, 1992.

Should you have any questions, feel free to contact me at (312) 886-4240. Sincerely yours,

Patrick Saieh, Permit Writer Permit Unit, UIC Section

WD-17J:P.Saieh:fh:4/15/92

Patrick's Disk #9 Document Name: Vance

M

15 FH 192

P.S. 4/15/92

Dear Sir,
We live within a few miles of The Kalium Chemicals plant and
hove had concerns from the beginning, concerning the quality of our
ground water and air. Now we are told Kalium is seeking to renew
its area permit and to drill two new wells. This poses some questions
which residents will want answers to and a public hearing would
enable us to address our concerns. Such as:

- A. What Types of wells will These be (Mining Fresh water- Disposal?)
- B. Why is Kalium requesting a permit for an area 12 times larger Than Their original permit?
- C. How can we be assured That The amount of fresh water The plant will require, once additional wells are put in, won't affect our water wells?
- Do what can we expect in The way of precautionary measures to contain and safeguerd against Hydrogen Sulfide emissions from an expanded mining operation?
- E. What Types of Monitoring reports will be required, etc.?

 And will These reports be available to The public
 and how will They be made available?

Concerned property owners and Residents of Osceola County William E. Strang Whie F. Strang

Patrick Saieh one services are desired, and complete it erse side. Failure to do this will prevent this evide you the name of the person delivered to rivices are available. Consult postmaster for the person delivered to fixing charge) 4. Article Number P 559 8206 Type of Service: Registered Express Mail Always obtain signature of addressee or agent and DATE DELIVERED. 8. Addressee's Address or agent and fee paid) requested and fee paid)		PELLO CONTRACTOR
lete items 1 and 2 when additive tete items 1 and 2 when additive tete items 1 and 2 when additional service(s) requested. In additional service(s) requested.	1. Date of Delivery 4-27-92	



Mr. + Mrs. Wm. Strang P.O. Box 158 Hersey, M. 49639

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Mrt. to & Mrs. William Stra Street and No. P.O. Box 158 P.O. State and ZIP Code Hersey, Michigan 49677 Postage Certified Fee Special Delivery Fee Restricted Delivery Fee Return Receipt showing to whom and Date Delivery Date, and Address of Delivery Return Receipt showing to whom. Date, and Address of Delivery	C m
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Richard J. Zdanowicz, Chief Underground Injection Control Section U.S. E. P.A., Region V V.S. E. P.A., Region V Tr West Jackson Blud. Chicago, IL60604

APR 1 5 1992

CERTIFIED MAIL P 559 848 206 RETURN RECEIPT REQUESTED

Mr. & Mrs. William Strang P.O. Box 158 Hersey, Michigan 49639

Re: Public Comments on the United States Environmental Protection Agency (USEPA) Draft Area Permit #MI-133-3G-A002

Dear Mr. & Mrs. Strang:

Thank you for your letter regarding the above-referenced draft area permit.

The scope of the Federal Underground Injection Control (UIC) regulations is to determine the soundness of siting, construction and operation of injection wells as they relate to the protection of underground sources of drinking water (USDWs). A USDW is an aquifer or its portion which contains less than 10,000 mg/l of total dissolved solids. In this case, all six existing and both proposed injection wells are adequately cemented to preclude the movement of fluids into or between USDWs due to injection operations. In addition, every injection well is required to demonstrate a two part Mechanical Integrity Test (MIT). The first part of MIT requires the permittee to demonstrate the absence of significant leaks in the casing, tubing and packer. This test is accomplished by setting a temporary rubber packer above the injection zone, between the tubing and production casing. The space between the tubing and casing is pressurized for at least 30 minutes with no more than 3% pressure drop in order to satisfy the first part of Mechanical Integrity (MI). The second part of the MI requires the permittee to demonstrate the absence of fluids movement into and between USDWs by using one of the following methods; temperature, noise or oxygen activation log. A descriptive report interpreting the results of such logs shall be prepared by a knowledgeable log analyst and submitted to our office for review. The permittee will also be required to demonstrate both parts of MI every 5 years from the last approved demonstration. Under permit conditions, the injection pressure will be limited to ensure the safe operation of the wells and quarterly reports of pressures, cumulative and produced volumes will be submitted to our office for review.

In your letter, you have expressed concerns over the quality of your ground-water due to injection well mining operations. As stated in the previous paragraph, all existing and all proposed wells are constructed and operated in such a manner so as to confine the injected fluid to the permitted interval and prevent the migration of any fluids into or between USDWs.

The proposed area permit is for Class III solution mining wells. Class III injection wells are wells which inject fluids for extraction of minerals such as solution mining of potash.

Kalium Chemicals, Ltd. is seeking an area permit which is about twelve times bigger than their existing area permit so that they will have more area to cover during the testing of potash. However, please be advised that under our current UIC regulations, there are no provisions which will allow the USEPA to limit the size of an area permit.

Kalium Chemicals, Ltd. will, before the expansion of the area project, perform hydrogeologic tests to determine that the amount of fresh water that will be used will not adversely affect the existing groundwater supplies of local residents. However, since the UIC section of the USEPA regulates only injection wells activities, we feel that perhaps your question regarding water wells should be addressed more fully by contacting: Mr. Mike Ulrich, Osceola County Department of Public Health, 115 North Sears, Reed City, Michigan 49677.

The UIC section of the USEPA only regulates injection well operations. As your question regarding the safeguards against hydrogen sulfide comes under the purview of the Michigan Department of Natural Resources (MDNR), we feel that your question regarding this matter could be addressed more fully by contacting: Mr. Larry Schultz, Environmental Engineer, Air Quality Division, Cadillac District Officer, MDNR, 8015 South Machinaw Trail, Cadillac, Michigan 49601.

Kalium Chemicals, Ltd. will be required to observe and record injection pressure semi-monthly and shall report this to the USEPA on a quarterly basis. The cumulative injected and produced volume shall be monitored daily and shall be reported quarterly. The specific gravity shall be monitored monthly and shall be reported quarterly. A copy of the draft permit, containing the USEPA monitoring requirements, is available for viewing at the Reed City Public Library, 410 West Upton, Reed City, Michigan. All monitoring data submitted by Kalium Chemicals, Ltd. is contained in the administrative record for this permit, and is available for viewing at 77 West Jackson Boulevard, Chicago, Illinois 60604-3590, between the hours of 9 a.m. to 4 p.m. You may also submit a Freedom of Information Act (FOIA) request under the Section 5 U.S.C. §522, and the Privacy Act of 1974 (PA) 5 U.S.C. §522(a) (enclosed).

The extension of the public comment period began on February 29, 1992, and ended on March 29, 1992. Your letter was received on April 7, 1992, which was after the close of the public comment extension period. Since the injection operations proposed by Kalium Chemicals, Ltd. meet all Federal UTC requirements for environmental protection, the USEPA will issue a final permit for this project, and feels that a public hearing is not warranted.

If you have any further questions, please contact Patrick Saieh of my staff at (312) 886-4240.

Sincerely yours,

Richard J. Zdanowicz, Chief Underground Injection Control Section

Enclosures

cc: Mike Ulrich Osceola County Department of Public Health 115 North Sears Reed City, Michigan 49677

Mr. Larry Schultz
Environmental Engineer
Air Quality Division
Cadillac District Officer
Michigan Department of Natural Resources
8015 South Machinaw Trail
Cadillac, Michigan 49601.

UIC Control #36 WD-17J:P.Saieh:mr:4/8/92

P.S. 4/9/92

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July 15 H

Please have a public hearing in regards to this matter

QUESTIONS FOR KALIUM RE: PERMIT APPLICATION

- 1) If a new area permit is issued, how long will it remain in effect?
- 2) How many new wells are proposed to be drilled over the permit period?
- 3) What types of wells are these? Mining? Fresh Water? Disposal?
- 4) Where will each of the proposed wells be located?
- 5) Why is a permit for an area 12 times larger than the original permit area now being sought?
- 6) What plans for expansion does Kalium forsee over the period of the new permit that requires a permit area of this size?
- 7) Will these plans require more fresh water than is currently being used? If so, how much?
- 8) Are new mining clusters contemplated within the expanded permit area?
- 9) If so, where will these new clusters be located and what is Kalium's timetable for putting them into production.
- 10) Will additional permits also be required from the M.D.N.R.?
- 11) If so, what types of permits are required and have these been applied for? Issued?
- 12) What precautionary measures are planned to contain and safeguard against Hydrogen Sulfide (sour gas) emissions from an expanded mining operation?
- 13) Are process fluids currently monitored for the presence of radionuclides (radio-active elements)? If so, what has been detected to date? If not, is such monitoring contemplated in the future?
- 14) What types of monitoring reports will be required? By whom? With what frequency?
- Will monitoring reports be made available to the general public without recourse to the Freedom of Information Acts? If so, how will these be made available? If not, why not?

RECEIVED

APR 2 1992

UIC SECTION FA = REGION V

Patrick Saleh ditional services are desired, and complete items reverse side. Failure to do this will prevent this card provide you the name of the person delivered to and services are available. Consult postmaster for fees	4. Article Number P 559 848 331 Type of Service: Registered C certified Express Mail Always obtain signature of addressee	
MD-17_j=UTC mr SENDER: Complete items 1 and 2 when additional services are desired, and complete items 3 and 4. Put your address in the "RETURN TO" Space on the reverse side. Failure to do this will prevent this card from being returned to you. The return receipt fee will provide you the name of the person delivered to and the date of delivery. For additional fees the following services are available. Consult postmaster for fees and check box(es) for additional service(s) requested.	Article Addressed to: C. C. Snow to wnom delivered, date, and addresses s address. A. A. Article Addressed to: E. C. Article Addressed to: P. A.	5. Signature — Addressee L 6. Signature — Agent 7. Date of Delivery , , , , , , , , , , , , , , , , , , ,
S Form 3800 , June 1990	Certified No Insurance	Mail Receipt Coverage Provided International Mail UIC mr Andresen on Avenue 49677 \$.52 1.00





Bichard St. Zdanowicz Mygrowed Byrothon Butrolde, 26, E.F.A. Region V 77 Host Juskem Bld.

Mr. William C. Andresen 336 W Slosson Ave. Reed City, MI 49677 APR 1 0 1992

CERTIFIED MAIL P 559 848 331 RETURN RECEIPT REQUESTED

Mr. William C. Andresen 336 West Slosson Avenue Reed City, Michigan 49677

Re: Public Comments on the United States Environmental Protection Agency (USEPA) Draft Area Permit #MI-133-3G-A002

Dear Mr. Andresen:

Thank you for your letter regarding the above-referenced draft area permit.

The scope of the Federal Underground Injection Control (UIC) regulations is to determine the soundness of siting, construction and operation of injection wells as they relate to the protection of underground sources of drinking water (USDWs). A USDW is an aquifer or its portion which contains less than 10,000 mg/l of total dissolved solids. In this case, all six existing and both proposed injection wells are adequately cemented to preclude the movement of fluids into or between USDWs due to injection operations. In addition, every injection well is required to demonstrate a two part Mechanical Integrity Test (MIT). The first part of MIT requires the permittee to demonstrate the absence of significant leaks in the casing, tubing and packer. This test is accomplished by setting a temporary rubber packer above the injection zone, between the tubing and production casing. The space between the tubing and casing is pressurized for at least 30 minutes with no more than 3% pressure drop in order to satisfy the first part of Mechanical Integrity (MI). The second part of the MI requires the permittee to demonstrate the absence of fluids movement into and between USDWs by using one of the following methods; temperature, noise or oxygen activation log. A descriptive report interpreting the results of such logs shall be prepared by a knowledgeable log analyst and submitted to our office for review. permittee will also be required to demonstrate both parts of MI every 5 years from the last approved demonstration. Under permit conditions, the injection pressure will be limited to ensure the safe operation of the wells and quarterly reports of pressures, cumulative and produced volumes will be submitted to our office for review.

The following are our responses to the questions raised in your letter in the same sequential order as your questions.

Response #1 - In accordance with 40 C.F.R. §144.36 (enclosed), all UIC permits for Class III wells will be issued for a period up to the operating life of the facility. However, the permit will be reviewed every 5 years from the effective date of the final issued permit.

Response #2 - In accordance with 40 C.F.R. §144.33 (enclosed), an applicant for a UIC permit may request a permit for an area rather than for each well individually provided that the proposed injection wells are constructed in a similar fashion as the existing injection wells. Although only two proposed wells will be converted at this time, the purpose of an area permit is to allow the applicant flexibility to construct, operate, convert or plug and abandon wells within the permitted area without having to apply for each proposed action individually. The exact number of wells to be drilled is not known at this time.

<u>Response #3</u> - The proposed area permit is for Class III solution mining wells. Class III injection wells are wells which inject fluids for extraction of minerals such as solution mining of potash.

Response #4 - The location of each proposed well is not known at this time, however, the purpose of an area permit is to allow Kalium Chemicals, Ltd. the flexibility to drill new wells anywhere within the permitted area, provided that Kalium Chemicals, Ltd. notifies the USEPA and complies with all permit conditions, including construction and mechanical integrity testing requirements.

Response #5 - Kalium Chemicals, Ltd. is seeking an area permit which is about twelve times bigger than their existing area permit so that they will have more area to cover during the testing of potash. However, please be advised that under our current UIC regulations, there are no provisions which will allow the USEPA to limit the size of an area permit.

Response #6 - At this time, Kalium Chemicals, Ltd. does not have any specific plan to expand their existing mining operations. Kalium Chemicals, Ltd. is proposing to expand their existing area permit so that when their existing cluster of wells no longer produce potash in an amount sufficient to be commercially feasible, Kalium Chemicals, Ltd. will have the option to drill new wells within the expanded area with no need to reapply for a USEPA permit. Mr. Rob Plosz from Kalium Chemicals, Ltd. stated during a phone conversation with Patrick Saieh of my staff that Kalium Chemicals, Ltd. has decided to apply for an area permit of this size so that they will have more area to cover during the testing of potash.

Response #7 - Kalium's mining process involves pumping fresh water through boreholes in potash beds 7500 feet below the surface, dissolving the potash-bearing portion of the ores and returning the solution to surface for refining. As Kalium Chemicals, Ltd. is proposing to expand their existing operations, more fresh water than what is currently being used will be needed. Because this is a proposed project the estimated amount of fresh water has not yet been determined.

Response #8 - At this time, Kalium Chemicals, Ltd. does not have specific plan to construct any new clusters. However, once the need arises, Kalium Chemicals, Ltd. will begin conducting tests within the permitted area to determine the best location for construction of new wells.

Response #9 - The location of the new clusters is not known at this time, however, Kalium Chemicals, Ltd. may construct, operate, convert or plug and abandon wells anywhere within the permitted area, provided that all permit requirements are met. The permit does not restrict Kalium Chemicals, Ltd. to a specific timetable to when they can start production.

Response #10 - In addition to the USEPA area permit, Kalium Chemicals, Ltd. is also required to apply to the Michigan Department of Natural Resources (MDNR) for permits and must receive an individual State permit before commencing the drilling of any new solution mining well.

Response #11 - Currently, there are six existing and two proposed Class III solution mining of potash injection wells listed under the proposed area permit. The six existing solution mining wells have already been permitted by MDNR, and the two proposed wells have not yet received permits from MDNR.

Response #12 - The UIC section of the USEPA only regulates injection wells operations. As your question regarding the safeguards against hydrogen sulfide comes under the purview of the MDNR, we feel that your question regarding this matter could be addressed more fully by contacting:

Mr. Larry Schultz, Environmental Engineer, Air Quality Division, Cadillac District Office, MDNR, 8015 South Machinaw Trail, Cadillac, Michigan 49601.

Response #13 - Kalium Chemicals, Ltd. does not chemically analyze process fluids specifically for radioactive elements. Potassium chloride (potash) has a naturally occurring radioactive isotope (40 K). Kalium Chemicals, Ltd. uses a well logging tool capable of measuring extremely low levels of this isotope. Any other radioactive element in the brines would be readily detected by this tool if present. To date Kalium Chemicals, Ltd. has not detected anything other than the normal potash 40 K isotope.

Response #14 - Kalium Chemicals, Ltd. will be required to observe and record injection pressure semi-monthly and shall report this to the USEPA on a quarterly basis. The cumulative injected and produced volume shall be monitored daily and shall be reported quarterly. The specific gravity shall be monitored monthly and shall be reported quarterly. A copy of the draft permit, containing the USEPA monitoring requirements, is available for viewing at the Reed City Public Library, 410 West Upton, Reed City, Michigan.

Response #15 - All monitoring data submitted by the applicant is contained in the administrative record for this permit, and is available for viewing at 77 West Jackson Boulevard, Chicago, Illinois 60604-3590, between the hours of 9 a.m. to 4 p.m.

The extension of the public comment period began on February 29, 1992, and ended on March 29, 1992. Your letter was received on April 2, 1992, which was after the close of the public comment extension period. Since the injection operations proposed by Kalium Chemicals, Ltd. meet all Federal UIC requirements for environmental protection, the USEPA will issue a final permit for this project, and feels that a public hearing is not warranted.

If you have any further questions, please contact Patrick Saieh of my staff at (312) 886-4240.

Sincerely yours,

Richard J. Zdanowicz, Chief Underground Injection Control Section

Enclosures

cc: Larry Schultz
Environmental Engineer
Air Quality Division
Cadillac District Office
Michigan Department of Natural Resource
8015 South Machinaw Trail
Cadillac, Michigan 49601

UIC Control #34 WD-17J:P.Saieh:mr:4/3/92

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WW-16T (UIC) P. Laich (ATI SENDER: COMPLETE THIS SECTION	OMPLETE THIS SECTION ON DELIVERY			
 Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired. Print your name and address on the reverse so that we can return the card to you. Attach this card to the back of the mailpiece, or on the front if space permits. Article Addressed to: Article Addressed to: Major Potash Harsey 13 95 135 4h Archael 49639 49639 49639 49639 49639 40000 /ul>	A. Signature X			
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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 5 77 WEST JACKSON BOULEVARD CHICAGO, IL 60604-3590

JUL 1 9 2013

REPLY TO THE ATTENTION OF: WU-16J

<u>CERTIFIED MAIL</u> 7001 0320 0005 8923 5045 RETURN RECEIPT REQUESTED

Mr. Douglas M. Patulski Mosaic Potash Hersey, LLC 1395 135th Avenue Hersey, Michigan 49639

Re: Authorization to Inject into the Following Well:

Well #1014, Michigan Department of Environmental Quality (MDEQ) Permit M403; U. S. Environmental Protection Agency Permit Number MI-133-3G-A002 in Osceola County, Michigan

Dear Mr. Patulski:

The results of the mechanical integrity demonstration for the well referenced above have been reviewed and have been found to be satisfactory. In accordance with permit conditions, Mosaic Potash Hersey, LLC of Hersey, Michigan is authorized to recommence injection into the well referenced above.

Should you have any questions regarding the above information, feel free to contact Patrick Saieh at (312) 886-4240.

Sincerely yours,

Rebecca L. Harvey, Chief

Underground Injection Control Branch

Phr 1/8/13

Phr 1/8/13



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 5 77 WEST JACKSON BOULEVARD CHICAGO, IL 60604-3590

JUL 1 9 2013

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Rebecca L. Harvey, Chief

Underground Injection Control Branch



Mosaic Potash Hersey 1395 135th Avenue Hersey, MI 49639 www.mosaicco.com Tel 231-832-8800 Fax 231-832-3349



July 12th, 2013

Lisa Perenchio, Chief Underground Injection Control Branch United States Environmental Protection Agency 77 W. Jackson Blvd, WU-16J Chicago, IL 60604-3590

RE:

Permit No. M403 / MI-133-3G-A002

Part I MIT on Mosaic Class III Well 1014



JUL I 8 2013

UIC BRANCH EPA, REGION 5

The Part 1 Mechanical Integrity Test for Well 1014 was passed on July 9th, 2013. The EPA did not witness the test per instructions from Jeff McDonald of USEPA. Mr. Stafford Dusenbury of the Michigan Department of Environmental Quality was present to witness the test. The Annular Pressure Test form completed by Mr. Dusenbury is enclosed. The USEPA Standard Annular Pressure Test form for an un-witnessed test is enclosed, along with the calibration certification for the pressure gauge that was used.

The well was previously scheduled for internal mechanical integrity on May 8th, but would not hold pressure, apparently due to a poor seal with the bridge plug. Since a loss of mechanical integrity was reported, an EPA Well Rework Record is also enclosed.

Please review the attached information and authorize Mosaic Potash Hersey to resume injection of Well 1014.

If you need additional information, please contact me at 231-832-8824 or douglas.patulski@mosaicco.com.

Sincerely.

Douglas M. Patulski

Production Superintendent

Mosaic Potash Hersey

Cc: Raymond Vugrinovich, Michigan Department of Environmental Quality

ANNULAR PRESSURE TEST

		Permit Number				
By authority of Part 615 or Part	325 of		٨	1-403		
Act 451 PA 1994, as amende Non-submission and/or falsification of the	ed. ils information	Well name & No.				
may result in fines and/or impriso	nment.	Surface location NW 1/4 of SW 1/4 of	WW 1/4, Section 26	T/7N R 9W		
Name and address of permittee		Township Harris	County	s con/a		
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			Well type			
•				P 1		
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•		Part 625 Waste d	isposal 🏿 🖂 Solutio	on mining		
Date of test		Casing	Tubing			
4/11/13- 7-9-13		Casing 7" 23th L80				
		Set (a) 79 33	Packer depth			
Type of gauge Parascia dific Disi	quarte Model 765	Packer type/model		ooft MD		
inch face psi range 0-3000	· ·	7" RBP	600	of the MID		
New gauge ☐ Yes ☒ No		Type of non-corrosive				
if no, enter date of test calibration		liquid in the annulus	bone			
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		readings (psig)				
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Signature of DEQ employee	Musikan		7-9-13			
Certification if not witnessed by DEQ represent	ative: "I state that√I am au	horized by said owner. This rep	ort was prepared under	my supervision and		
direction. The facts stated herein are true, acc	urate and complete to the	best of my knowledge."				
Signature		Date	e			
MAIL TO: OFFICE OF GEO	LOGICAL SURVEY					

MAIL TO: OFFICE OF GEOLOGICAL SURVEY
MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

PO BOX 30256

EQP 7606 (rev. 8/2004)

LANSING MI 48909-7756

UNITED ATES ENVIRONMENTAL PROTE(ON AGENCY STANDARD ANNULAR PRESSURE TEST

Operator Mosaic Potasii HEESEY	State Permit No. M 903
Address /395 /35TH AVE	USEPA Permit No. Mr -(33-36-A002
_	
HERSEY, MI 49639	Date of Test 7/9/2013
Well Name Masaic 1014	Well Type CLASS III
LOCATION INFORMATION Quarter of	the 5W Quarter of the WW Quarter
of Section 26; Range 9W; Towns	ship; County;
Company Representative William Hicks; F	Field Inspector STAFFED DUSTABULY (MOFO)
Type of Pressure Gauge Pigital inch face; 19-3400	psi full scale; 0.0000 psi increments;
New Gauge? Yes □ No ☑ If no, date of calibration 6/26/20.	Calibration certification submitted? Yes ☐ No ☐
TEST RESULTS Readings growths taken at least avery 10 minutes for a	5-year or annual test on time? Yes □ No 🖼
Readings must be taken at least every 10 minutes for a minimum of 30 minutes for Class II, III and V wells and 60	2-year test for TA'd wells on time? Yes □ No □
minutes for Class I wells.	After rework? Yes ► No □
For Class II wells, annulus pressue should be at least 300	Newly permitted well? Yes □ No □
psig. For Class I wells, annulus pressure should be the greater of 300 psig or 100 psi above maximum permitted	Newly permitted well: Tes in No in
injection pressure.	
Original chart recordings must be submitted with this form.	
Pressure (in psig)	
Time Annulus Tubing	Casing size 7"- 23 #
10:00 1384:4048 NONE	Tubing size None
10:05 1384.0123	Packer type <u>Beille Flub</u> Packer set @ Lago w.D 5860 TVD Meen
10:10 /383.6611 10:15 /383,1744	Packer set @ <u>Lesso MD 5860 7VD APPON</u> Top of Permitted Injection Zone 5765'
19:20 1382.5665	Is packer 100 ft or less above top of
10:25 1382.1490	Injection Zone? Yes ☒ No ☐
10:30 1381. 5997	If not, please submit a justification.
	Fluid return (gal.) 29.5 GALLOWS
	Comments:
Test Pressures: Max. Allowable Pressure Change: Ini	tial test pressure x 0.03 4/1.53 psi
Te	st Period Pressure change Z.805 psi
Test Passed ☑ Test Failed □	
If failed test, well must be shut in, no injection can occur, an	
Corrective action needs to occur, the well retested, and writt recommence.	en aumorization received before injection can
I certify under penalty of law that this document and all attached	
belief, true, accurate, and complete. I am aware that there are information, including the possibility of fine and imprisonm	

Printed Name of Company Representative Signature of Company Representative

United States Environmental Protection Agency Washington, DC 20460

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4500 148th Avenue N. Redmond, WA 98052-5194 Telephone: (425) 883-8700 Facsimile: (425) 867-5407 Email: support@paroscientific.com Internet:http://www.paroscientific.com

CERTIFICATE OF CONFORMANCE

CUSTOMER:	MOSAIC POTASH HERSEY			
PURCHASE ORDER:	CHARGE			
DIGIQUARTZ MODEL:	765-3K			
PART NUMBER:	1100-019-0			
SERIAL NUMBER(S):	105210			

PAROSCIENTIFIC INCORPORATED certifies that the part(s) identified above complies with the requirements of the above order and has been manufactured in accordance with engineering drawings, material and process specifications, testing procedures, and applicable specification drawing of Paroscientific Incorporated. The Digiquartz model(s) identified has been calibrated and tested over the specified pressure and temperature range and meets the requirements of the applicable specification drawing. Primary pressure, temperature standards and transfer standards used at Paroscientific Incorporated for calibration and testing have traceability to the National Institute of Standards and Technology and are regularly checked and calibrated according to Paroscientific QA Procedure Q8521, Inspection Test and Measurement Equipment, in accordance with the requirements of ISO 9001:2008.

Whenes Schulman

6/26/12

AUTHORIZED SIGNATURE

DATE

Warren Schuchman, Quality Assurance Manager

Digiquartz®
Technology

Precision Pressure Instrumentation
Document no. T8148, Rev "AU", 11 Oct 2011 page 1 of 2

4500 148th Avenue N. Redmond, WA 98052-5194 Telephone: (425) 883-8700 Facsimile: (425) 867-5407 Email: support@paroscientific.com Internet:http://www.paroscientific.com

CERTIFICATION OF TRACEABILITY TO NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY

Primary pressure and temperature standards used in the calibration and testing of Paroscientific Digiquartz
Models have traceability to the National Institute of Standards and Technology through the following
documentation.

Bell and Howell Primary Pressure Standard:

Bell and Howell, Model 6-201-0001, Piston/Cylinder P2-919/C2-1523 via DH Calibration Report No. 15441 and 16653 traceable to NIST. Weight Set 1, P/N 6-002-0002, via DH Calibration Report No. 14481, 16654 and 1284473284 traceable to NIST. Weight Set 2, P/N 6-002-0002, via DH Calibration Report No. 14576, 16603, 31227, 39628, 68390 and 1317389777 traceable to NIST. Piston/Cylinder P2-652/C2-1378 via DH Instruments Calibration Report No. 14575, 16602, 31226, 39627, 68389 and 1317739617 traceable to NIST. Piston/Cylinder P1-231/C1-384 via DH Instruments Calibration Report No. 13170 and 1284475131 traceable to NIST. Piston/Cylinder P/N 6-201, No. P1-949/C1-922, via DH Instruments Calibration Report 17176 and 17445, traceable to NIST.

DH Primary Pressure Standard, Oil Operated Gauge:

DH Instruments, Model 5306, Piston/Cylinder S/N 3375, via DH Calibration Certificate Report No. 8398, 22146, 32354, 45306, 66563 and 1305698573 traceable to NIST. Piston/Cylinder 3511 via DH Calibration Report No. 8399, 22147, 32353, 45307, 66562 and 1305625084 traceable to NIST. Mass Set S/N 2032 via DH Calibration Report No. 24809, 24826, 45305, 45308, 1305538925 and 1305530461 traceable to NIST.

DH Primary Pressure Standard, Pneumatic Operated Gauge:

DH Instruments, Model 5203, Piston/Cylinder S/N 4845, via DH Calibration Certificate No. 8541, 27161, 38275 and 1300177141 traceable to NIST. Mass Set S/N 2032/3293 via DH Calibration Certificate Nos.4630, 24809, 8540, 32142, 45305 and 1300200369 traceable to NIST.

DH Primary Pressure Standard, Pneumatic Operated Gauge:

DH instruments, Model PG7601 via DH Instruments Calibration No. 32162, 41492 and 69127 traceable to NIST. Piston/Cylinder S/N 305 via DH Instruments Calibration No. 20281, 32161, 41490 and 69125 traceable to NIST. DH Instruments 35 kg Mass Set No. 2052 and Bell No. 261A via DH Instruments Calibration Report No. 20282, 32163, 32164, 41491, 41493, 69126 and 69124 traceable to NIST.

Hygroclip S3 MET4/4A Part number 1560-XXX and 1561-XXX:

Humidity and Temperature calibrations are traceable to NIST through Rotronic Instrument Corporation; 160 E. Main Street, Huntington, NY 11743.

Hygroclip HC2-S3 MET4/4A Part number 1563-XXX and 1564-XXX Swiss Calibration Service (SCS)

Humidity and Temperature calibrations are traceable to SCS through Rotronic AG Grindelstrasse 6 8303 Bassersdorf Phone: 044-838-1111 E-mail: info@rotronic.ch



An ISO9001:2008 registered company

45C 48th Avenue N. E. Facsimile: (425) 867-5407 Redmond, WA 98052-5194 Email:support@paroscientific.com Telephone: (425) 883-8700 Internet:http://www.paroscientific.com

CERTIFICATE OF CALIBRATION

DIGIQUARTZ MODEL: 765-3K SERIAL NUMBER(S): 105210

The Paroscientific Digiquartz Model (s) identified above has been calibrated and tested with one or more of the following primary pressure standards. All have traceability to the National Institute of Standards and Technology.

	ds. All have traceability to the National Institute of Stand	dards and lechn	ology.
	<u>d Howell Primary Pressure Standard</u> atic Absolute or Gauge Dead Weight Tester Part Numbe	er: 6-201-0001,	S/N 4034 and S/N 1014
	Piston/Cylinder: 6-001-0002, P2-919/C2-1523, Weight Set 1: 6-002-0002 Range: 1.5 to 50 psi [10 to 345 kPa] Accuracy: 0.010 percent of reading		Piston/Cylinder: 6-001-0001, P1-949/C1-922, Weight Set 2: 6-002-0002 Range: 0.3 to 5 psi [2 to 34 kPa] Accuracy: 0.015 percent of reading
×	Piston/Cylinder: 6-001-0002, P2-652/C2-1378, Weight Set 2: 6-002-0002 Range: 1.5 to 50 psi [10 to 345 kPa] Accuracy: 0.010 percent of reading		
	mary Pressure Standard natic Absolute or Gauge Dead Weight Tester Part Numb	per: PG7601 S/N	161
	Piston/Cylinder: S/N 305, Mass Set: S/N 2052 Range: 0.7 to 50 psi [5 to 345 kPa] absolute mode, Accuracy: 0.002 percent of reading	, 0.29 to 50 psi [2	2 to 345 kPa] gauge mode
DH Pri	imary Pressure Standard		
Pneun	natic Gauge Dead Weight Tester, Model 5203, S/N 5557	7	
	Piston/Cylinder: S/N 4845, Mass Sets: S/N 2032, S Range: 20 to 1,600 psi [0.14 to 11 MPa] Accuracy: 0.005 percent of reading	S/Ņ 3293	
DH Pr	imary Pressure Standard		
Oil Op	perated Gauge Dead Weight Tester, Model 5306, S/N 35	505	
	Piston/Cylinder: S/N 3375, Mass Set: S/N 2032 Range: 40 to 20,000 psi [0.3 to 138 MPa] Accuracy: 0.01 percent of reading above 200 psi [100,000 psi	-	
	Piston/Cyllnder: S/N 3511, Mass Set: S/N 2032 Range: 145 to 72,500 psi [1 to 500 MPa] Accuracy: 0.02 percent of reading above 725 psi [5 or 0.145 psi [1 kPa] at lower pressu	=	PARO TEST 18

Digiquartz® Pressure Instrumentation

Document No. 8145-001, Rev. P 9/22/10

Pressure Instrument Configuration

SN: 105210 Part Number: 1100-019-0 Model: 765-3K Port: Oil Filled

Calibration Date: 26-Jun-12 Report No: 14293 Technician: RM

Pressure Range: 0 to 3000 psia Temperature Range: 0 to 40 deg C

Customer: Mosaic Potash Hersey Report Date: 26-Jun-12

Address: 1395 135th Avenue Sales Order: 30096

Hersey, MI 49639 USA S/R Number : 10251

	guration	Cau	ancacton a	oefficients -
BL: 0	PT: N	UO:	5.813680	μsec
BR: 9600	QD: -	Y1:	-3958.154	deg C / µsec
DD: -	QO: -	Y2:	-13865.89	deg C / µsec²
DL: 0	SL: -	Y3:	-138805.8	deg C / μsec³
DM: 0	SN: 105210	C1:	-14414.57	- [
DO: -	ST: -	C2:		psi / µsec
DP: 6	su: O	11	48299.55	psi / µsec²
ID: 07	TI: 4670	D1:	0.0446906	
IM: -	TR: 952	D2:	0.0000000	
LL: -	TU: 0	T1:	30.00206	μsec
LH: -	UF: 1.000000	T2:		µsec / µsec
MC: Y	UL:	т3:		µsec / µsec²
MD: 1	UM: USER	T4:		µsec / µsec³
MN: 765-3K	UN: 1	T5:		µsec / µsec'
OP: -	US: 0	TC:	0.6781528	
PF: 3000.000	VR: P1.06	PA:		
PI: 4670	ZI: O	PM:	0.9999510	
PL: 3600.000	ZS: 0			
PO: 0	ZL: 0			
PR: 238	ZV: .0000000			
PS: 0				
AL: .0000000				
AU: 3000.000				
GD: 0				
GT: 0				
LW: O				
PC: .9999510				
PX: 5				
RS: 1				
RU: -				
				-
	•			

Paroscientific, Inc.

4500 148th Ave. N.E. Redmond, WA 98052 Phone: (425)883-8700 Fax: (425)867-5407

Web:http://www.paroscientific.com
Email: support@paroscientific.com

Prepared by







UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 5 77 WEST JACKSON BOULEVARD CHICAGO, IL 60604-3590

JUL 1 9 2013

REPLY TO THE ATTENTION OF: WU-16J

CERTIFIED MAIL 7001 0320 0005 8923 5045 RETURN RECEIPT REQUESTED

Mr. Douglas M. Patulski Mosaic Potash Hersey, LLC 1395 135th Avenue Hersey, Michigan 49639

Re: Authorization to Inject into the Following Well:

Well #1014, Michigan Department of Environmental Quality (MDEQ) Permit M403; U. S. Environmental Protection Agency Permit Number MI-133-3G-A002 in Osceola County, Michigan

Dear Mr. Patulski:

The results of the mechanical integrity demonstration for the well referenced above have been reviewed and have been found to be satisfactory. In accordance with permit conditions, Mosaic Potash Hersey, LLC of Hersey, Michigan is authorized to recommence injection into the well referenced above.

Should you have any questions regarding the above information, feel free to contact Patrick Saieh at (312) 886-4240.

Sincerely yours,

Rebecca L. Harvey, Chief Underground Injection Control Branch

5120	U.S. Postal S CERTIFIED (Domestic Mail O	DIE REC	CEIPT Coverage Provided) O
E E	Postage	s LFG \$0.46	0041
=0	Certified Fee	310\$3.10	1410 Rostmark
000	Return Receipt Fee (Endorsement Required)	25 2.55	Here
00	Restricted Delivery Fee (Endorsement Required)	\$0.00	(/ 37) 9 - 1
	Total Postage & Fees	\$ 6 7 \$6.11	06/26/2013/
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7007	Street, Apt. No.; 12 0	5 /2544	Allme The
70	City, Et. te, ZIP+4	MIT A	9439 49629
TANKS A	PS Form 3800, January 20	101	Sec Reverse for Instructions

SENDER: COMPLETE THIS SECTION	COMPLETE THIS SECTION ON DELIVERY
■ Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired. ■ Print your name and address on the reverse so that we can return the card to you. ■ Attach this card to the back of the mailpiece, or on the front if space permits. 1. Article Addressed to: Article Addressed to: Article Add	A. Signature X. Leslica Rucka Agent Addressee B. Received by (Printed Name) C. Date of Dulivery Leslica Hick Yes If YES, enter delivery address below: No
1395 135 MI 49639	3. Service Type C Certified Mail
2. Article Number (Transfer from service label)	4. Restricted Delivery? (Extra Fee)
PS Form 3811 February 2004 Domestic Ret	urn Receipt 102595-02-M-1540



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 5 77 WEST JACKSON BOULEVARD CHICAGO, IL 60604-3590

JUN 2 4 2013

REPLY TO THE ATTENTION OF: WU-16J

CERTIFIED MAIL 7001 0320 0005 8923 5120 RETURN RECEIPT REQUESTED

Mr. Douglas M. Patulski Mosaic Potash Hersey LLC 1395 135th Avenue Hersey, Michigan 49639

Re:

Cease Injection: Well #1014 Injection Well, Osceola County, Michigan Class III U. S. Environmental Protection Agency Permit #MI-133-3G-A002

Dear Mr. Patulski:

The U. S. Environmental Protection Agency has received your letter dated May 9, 2013 regarding the loss of mechanical integrity for the above referenced injection well. Based on the information that was reported in your letter dated May 9, 2013 the EPA has concluded that the above referenced well lost mechanical integrity pursuant to 40 CFR § 146.8(a)(1) (enclosed).

You are hereby notified that the above referenced well must remain shut in until the requirements in the paragraph below are met. Continued injection is a violation of the Underground Injection Control regulations and the Safe Drinking Water Act.

Within 30 days from receipt of this letter, you must satisfy the mechanical integrity requirement of 40 CFR §146.8(a)(1). Also, be advised that pursuant to your permit conditions, you are required to notify the EPA contact persons Fredia Hardin (312) 886-1493 or Jeffrey McDonald (312) 353-6288 at least 30 days in advance to schedule the witnessing of the mechanical integrity test or the plugging and abandonment of the well. The scheduling of the witnessing of these mechanical integrity tests must go through the Region 5, Chicago Office. Injection may not resume until you have met these requirements and received written authorization to resume injection.

You should be aware that violations of the Safe Drinking Water Act and Underground Injection Control regulations are subject to Administrative Orders which may include penalties of up to \$177,500 civil penalties of up to \$37,500 per day of violation, and criminal penalties of up to 3 years imprisonment and fines in accordance with Title 18 of the United States Code, should you decide to continue injection.

Sincerely,

Rebecca L. Harvey, Chief Underground Injection Control Branch

Enclosure

CC:

Sam Williams

AEM Group

bcc: Fredia Hardin

6/20/13/Cease Injection Letter to MOSAIC POTASH HERSEY LLC on F.Hardin's F-Drive MosaicA002-1014(Ltrhead-2013).doc

AP 6/21/13
AP 6/21/13



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 5 77 WEST JACKSON BOULEVARD CHICAGO, IL 60604-3590

JUN 2 4 2013

reply to the attention of: WU-16J

CERTIFIED MAIL 7001 0320 0005 8923 5120 RETURN RECEIPT REQUESTED

Mr. Douglas M. Patulski Mosaic Potash Hersey LLC 1395 135th Avenue Hersey, Michigan 49639

Re:

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Sincerely,

Rebecca L. Harvey, Chief

Underground Injection Control Branch

Enclosure.

CC:

Sam Williams AEM Group

Hardin, Fredia

Streem Center [DoNotReply@epa.gov] Monday, June 24, 2013 4:14 PM Hardin, Fredia Streem Results - Failure - Fax From:

Sent:

To:

Subject:



Streem Broadcast	Result Summary (click to view results on-line)					
Job Number	2779	Submitted	6/24/2013 4:06:53 PM			
Subject	Fax	Recipients	1			
Total Pages	3	Status	0 of 1 successful			
Billing Info						

Recipient Results									
Name	Number/ Address	Result	Acknowledgement	Attempts	Date/ Time	Elapsed Time			
	(231) 832- 3349	Error: Can't complete call: Not Connected		2	6/24/2013 4:13:01 PM	01:40			



Mosaic Potash Hersev ' C 1395 135th Avenue Hersey, MI 49639 www.mosaicco.com

Tel 231-832-8800 Fax 231-832-3349

a cease syjohan litter The

May 9th, 2013

Lisa Perenchio, Chief Underground Injection Control Branch United States Environmental Protection Agency 77 W. Jackson Blvd, WU-16J Chicago, IL 60604-3590 UIC BRANCH EPA, REGION 5

MAY 1 4 2013

O Sceolar County

RE:

MI-133-3G-A002

Mosaic Class III Well 1014 - Loss of Mechanical Integrity

On May 8th, 2013, prior to starting the Part I MIT (Annular Pressure Test), it was determined that the Mosaic Class III Solution Mining Well 1014 had lost mechanical integrity. There was a steady loss of annulus pressure while pressuring up the well. The test was ceased and the well was shut-in with a verified loss of mechanical integrity at approximately 2:00pm. The well had previously been shut-in since November 11th, 2010. This well will not be operated until repairs have been made and permission to inject is received from the EPA.

I left a message on Jeff McDonald's phone on the 9^{th} regarding the loss of mechanical integrity in compliance with Part I(E)(10)(e)(i) of the permit. This letter is the written notification required by Part I(E)(10)(e)(ii) of the permit.

If you need additional information, please contact me at 231-832-8824 or douglas.patulski@mosaicco.com.

Sincerely,

Douglas M. Patulski

Production Superintendent

Mosaic Potash Hersey

Cc: Raymond Vugrinovich, Michigan Department of Environmental Quality

Cc: Karl Tomaszewski, Site Manager Hersey

m1/33 36 A002

Urchel, Raymond

From:

Urchel, Raymond

Sent: To:

Tuesday, June 04, 2013 9:53 AM Patrick Saieh; Clarissa Manzon

Subject:

Class 3 Mosaic #2062

Patrick – According to the data base, this well has been TA for more than 2 years – a permit violation.

I left a voice mail with Ray Vugrinovich late Friday afternoon to see what MDEQ showed.

He left me a voice mail message yesterday.

On May 8, 2013, he witnessed both a temperature log and an annulus pressure test at the well. (Violation goes poof!)

He said both passed. He also said he sent in a letter to the Region about this.

Patrick, what information do you need so the test results can be added to the UIC data base? Did you get the letter from Ray Vugrinovich?

Ray

Charissa - Bill Bates is Checking the two tests. He will update the UIC

Ry 6/4/2013

B. Bartes - 6/6/2013 He updated the database. Test date - 5-15-2013.

Home Front Office WECAB GWDW NPDES STPB UIC WOB WW Deepwell Home Add Print Reports Home > Technical Review > Reports Facility: Mosaic Potash Hersey Llc Permit: MI-133-3G-A002 State Permit: MIS M409 Well: WELL #2062 Contact: Karl Tomaszewski 231-832-8800 Reports YEAR MIR MAP MIAPD IV PH SG 2008 7.20 1.18 2009 7.90 1.04 N6651 2010 7.30 1.17 1.0410 2011 6.90 2012 7.40 1.0320 Quarterly Reports MAP QUARTER MIP MIR MIAPD IV PH YEAR SG 2009 7.90 1.04 2010 1 7.30 1.17 Monthly Reports MONTH MIP MIR MAP MIAPD IV SG 2013 Feb 2013 0 Jan 0 2012 Dec 0 7 1.0680 2012 0 Nov 2012 0 0 2012 0 0 9 1.0240 Sep 2012 Aug 0 2012 Jul 0 0 2012 7.50 0 0 1.0220 May 2012 0 0 0 0 2012 2012 Mar 0 0 7.40 1.0320 0 0 2012 Feb 2012 0 0 Jan 1.0040 2011 0 0 7.90 Dec 2011 0 0 2011 Oct 0 0 2011 Sep 0 0 6.90 1.0960 2011 Aug 0 0 2011 0 Jul 0 7.10 1.0640 2011 Jun 0 0 2011 0 May 2011 0 0 Apr 2011 Mar 0 0 6.90 1.0410 2011 Feb 2011 Jan 0 0 2010 0 2010 0 0 Nov 2010 Oct 0

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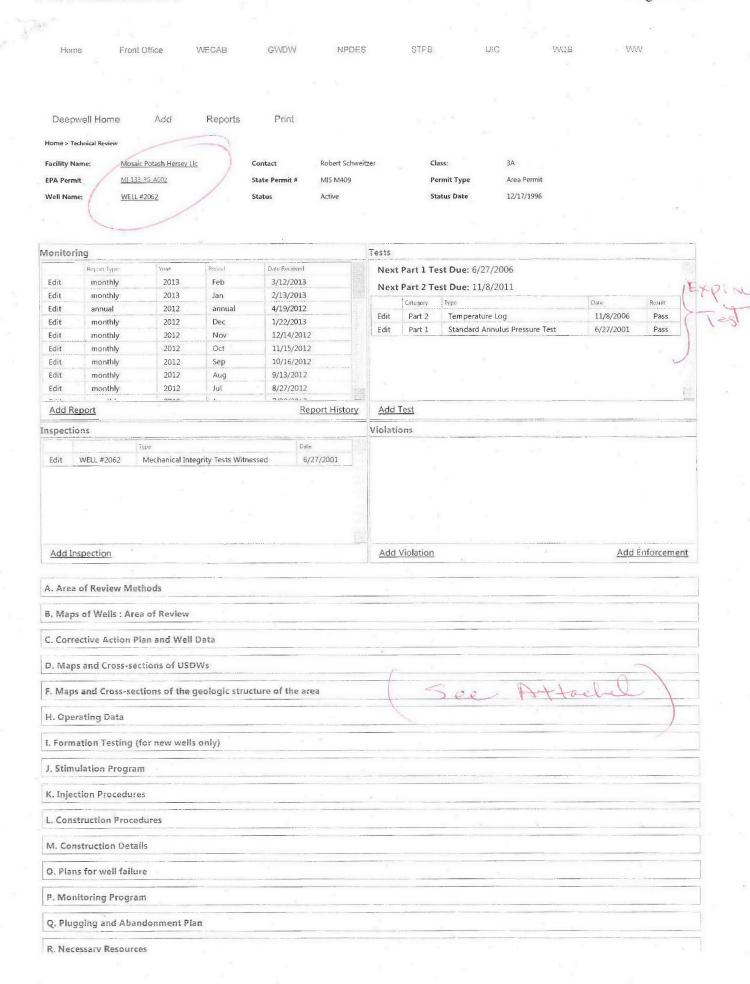
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1		-	-	
2010	Jul	0	0	
2010	Jun	. 0	0	
2010	May	0	0	7.30 1.17
2010	Apr	0	0	7.30 1.17
2010	Mar	0	0	7.30 1.17
2010	Feb	0	0	7.30 1.17
2010	Jan	0	0	7.30 1.17

- 14. Plugging and Abandonment. The permittee shall plug and abandon any well covered under this permit consistent with 40 CFR 146.10, as provided for in the plugging and abandonment plan contained in Part III(B) of this permit. Within sixty (60) working days after plugging a well, or at the time of the next quarterly report (whichever is shorter), the permittee shall submit a report to the Director. The report shall be certified as accurate by the person who performed the plugging operation, and shall consist of either:
 - (a) A statement that the well was plugged in accordance with the plan previously submitted to the Director; or
 - (b) If the actual plugging differed from the approved plan, a statement defining the actual plugging and explaining why the Director should approve such deviation. Any deviation from a previously approved plan which may endanger underground sources of drinking water is cause for the Director to require the operator to replug the well.
- 15. <u>Inactive Wells</u>. After cessation of injection for two (2) years the permittee shall plug and abandon a well in accordance with the plan and 40 CFR 144.52 (a) (6) unless the permittee has:
 - (a) Provided notice to the Director; and
 - (b) Described actions or procedures, which are deemed satisfactory by the Director, that the permittee will take to ensure that the well will not endanger underground sources of drinking water during the period of temporary abandonment. These actions and procedures shall include compliance with the technical requirements applicable to active injection wells unless waived, in writing, by the Director.
- responsibility and resources to plug and abandon the underground injection wells in accordance with 40 CFR 144.52(a) (7) as provided in Attachment R of the administrative record corresponding to this permit action which is hereby incorporated by reference as if it appeared fully set forth herein. The permittee shall not substitute an alternative demonstration of financial responsibility from that which the Director has approved, unless the permittee has previously submitted evidence of that alternative demonstration to the Director and the Director has notified the permittee in writing that the alternative demonstration of financial responsibility is acceptable. The financial responsibility mechanism shall be updated periodically, upon request of the Director, except when



S. Aquifer Exemptions	 	
T. Existing Permits	 	
U. Description of Business		
V. Compliance with other Federal Acts		
X. Confidentiality		
Other		
AA\Cmanzon		

Home

Front Office

WECAB

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WQB

WW

Deepwell Home

Add

Reports

Print

Home > Technical Review > Reports

Facility:

Mosaic Potash Hersey Llc

Permit:

MI-133-3G-A002

Well:

WELL #2062

State Permit:

MIS M409

Contact:

Karl Tomaszewski 231-832-8800®

Reports

YEAR	MIP	MIR	MAP	MIAPD	IV	РН	SG
2008			7.20	1.18			
2009						7.90	1.04
2010					7.30	1.17	
2011				6.90	1.0410		
2012				7.40	1.0320		
2013					8.80	1.0380	

Quarterly Reports

YEAR	QUARTER	MIP	MIR	MAP	MIAPD	IV	PH	SG	FL
2009	1						7.90	1.04	
2010	1						7.30	1.17	

Monthly Reports

WIGHT	reports							
YEAR	монтн	MIP	MIR	МАР	MIAPD	IV	PH	SG
2013	Mar	0	0				8.80	1.0380
2013	Feb	0	0					
2013	Jan	0	0					
2012	Dec	0	0				7	1.0680
2012	Nov	0	0					
2012	Oct	0	0					
2012	Sep	0	0				9	1.0240
2012	Aug	0	0					
2012	Jul	0	0					
2012	Jun	0	0				7.50	1.0220
2012	May	0	0					
2012	Apr	0	0					
2012	Mar	0	0				7.40	1.0320
2012	Feb	0	0					
2012	Jan	0	0					
2011	Dec	0	0				7.90	1.0040
2011	Nov	0	0					
2011	Oct	0	0					
2011	Sep	0	0				6.90	1.0960
2011	Aug	0	0					
2011	Jul	0	0					

2011	Jun	0	0	7.10	1.0640
2011	May	0	0		
2011	Apr	0	0		
2011	Mar	0	0	6.90	1.0410
2011	Feb	0	0		
2011	Jan	0	0		
2010	Dec	0	0		
2010	Nov	0	0		
2010	Oct	0	0		
2010	Sep	0	0	7.70	1.06
2010	Aug	0	0		
2010	Jul	0	0		
2010	Jun	0	0		
2010	May	0	0	7.30	1.17
2010	Apr	0	0	7.30	1.17
2010	Mar	0	0	7.30	1.17
2010	Feb	0	0	7.30	1.17
2010	Jan	0	0	7.30	1.17

Home Front Office GWDW WOB Deepwell Home Add Reports Print Home > Technical Review Facility Name: Mosaic Potash Hersey Llc MI-133-3G-A002 **EPA Permit** MIS M409 Permit Type Area Permit Well Name: WELL #2062 12/17/1996 Status Active Status Date Monitoring Tests Report Type Period Date Received Next Part 1 Test Due: 6/27/2006 Edit 2013 annual annua 4/22/2013 Next Part 2 Test Due: 11/8/2011 Edit 2013 monthly 4/22/2013 Mar Edit 2013 monthly Feb 3/12/2013 Edit Part 2 Temperature Log 11/8/2006 Pass Edit monthly 2013 2/13/2013 Edit Part 1 Standard Annulus Pressure Test 6/27/2001 Pass Edit 2012 annua 4/19/2012 Edit monthly 2012 Dec 1/22/2013 Edit 2012 monthly Nov 12/14/2012 Edit monthly 2012 Oct 11/15/2012 Edit monthly 2012 Sep 10/16/2012 Add Report Report History Add Test Inspections Violations Date WELL #2062 Mechanical Integrity Tests Witnessed 6/27/2001 Add Inspection Add Violation Add Enforcement A. Area of Review Methods B. Maps of Wells: Area of Review C. Corrective Action Plan and Well Data D. Maps and Cross-sections of USDWs F. Maps and Cross-sections of the geologic structure of the area H. Operating Data I. Formation Testing (for new wells only) J. Stimulation Program K. Injection Procedures L. Construction Procedures M. Construction Details O. Plans for well failure P. Monitoring Program Q. Plugging and Abandonment Plan

R. Necessarv Resources

<u> </u>	
S. Aquifer Exemptions	
T. Existing Permits	
U. Description of Business	
V. Compliance with other Federal Acts	
X. Confidentiality	
Other	
AA\Cmanzon	

5002	U.S. Postal Service CERTIFIED MAIL RECEIPT (Domestic Mail Only; No Insurance Coverage Pro	ovided)
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City, St	1. Apr. No.; 1. Ap	

Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired. Print your name and address on the reverse so that we can return the card to you. Attach this card to the back of the mailpiece, or on the foots if ones.		A. Signatura	Inted Name)	Agent Addresse C. Date of Deliver
or on the front if space permits. 1. Article Addressed to:	_	D. Is delivery addres	ollan significant from Ital	8 to 22
Douglas Patuliki mosaic		If YES, enter deli	ery address belor	w: 🗆 No
Douglas Patulski mosaic 139,5135th Aue. Heroey, M1 49639		3. Service Type Certified Mail Registered Insured Mail Restricted Delivery	Express Mail Return Rece	w: 🗆 No



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 5 77 WEST JACKSON BOULEVARD CHICAGO, IL 60604-3590

AUG 1 3 2013

Reply to the attention of: WU-16J

<u>CERTIFIED MAIL</u> 7001 0320 0005 8923 5007 RETURN RECEIPT REQUESTED

Mr. Douglas M. Patulski Mosaic Potash Hersey, LLC 1395 135th Avenue Hersey, Michigan 49639

Re: Authorization to Inject into the Following Well:

Well #1013, Michigan Department of Environmental Quality (MDEQ) Permit M385; U. S. Environmental Protection Agency Permit Number MI-133-3G-A002 in Osceola County, Michigan

Dear Mr. Patulski:

The results of the mechanical integrity demonstration for the well referenced above have been reviewed and have been found to be satisfactory. In accordance with permit conditions, Mosaic Potash Hersey, LLC of Hersey, Michigan is authorized to recommence injection into the well referenced above.

Should you have any questions regarding the above information, feel free to contact Patrick Saieh at (312) 886-4240 or saieh.patrick@epa.gov.

Sincerely yours,

Rebecca L. Harvey, Chief Underground Injection Control Branch

MH 13/13 PM 8/19/17

128/3/13 p. 5.8/12/13



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 5 77 WEST JACKSON BOULLVARD CHICAGO, IL 60604-3590

AUG 1 3 2013

REPLY TO THE ATTENTION OF: WU-16J

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Dear Mr. Patulski:

The results of the mechanical integrity demonstration for the well referenced above have been reviewed and have been found to be satisfactory. In accordance with permit conditions, Mosaic Potash Hersey, LLC of Hersey, Michigan is authorized to recommence injection into the well referenced above.

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Sincerely yours,

Rebecca L. Harvey, Chief

Underground Injection Control Branch



August 7th, 2013

Lisa Perenchio, Chief Underground Injection Control Branch United States Environmental Protection Agency 77 W. Jackson Blvd, WU-16J Chicago, IL 60604-3590

RE:

Permit No. M385 / MI-133-3G-A002

Part I MIT on Mosaic Class III Well 1013



The Part 1 Mechanical Integrity Test for Well 1013 was passed on August 1st, 2013. The EPA did not witness the test per instructions from Jeff McDonald of USEPA. Mr. Ray Vugrinovich of the Michigan Department of Environmental Quality was present to witness the test. The Annular Pressure Test form completed by Mr. Vugrinovich is enclosed. The USEPA Standard Annular Pressure Test form for an un-witnessed test is enclosed, along with the calibration certification for the pressure gauge that was used.

The Internal MIT for this well was overdue, since March12th, 2013. The well has been shut-in prior to that date and since. Please review the attached information and authorize Mosaic Potash Hersey to resume injection of Well 1013.

If you need additional information, please contact me at 231-832-8824 or douglas.patulski@mosaicco.com.

Sincerely,

Douglas M. Patulski

Production Superintendent

Mosaic Potash Hersey

Cc: Raymond Vugrinovich, Michigan Department of Environmental Quality

JLOGICAL SURVEY

ANNULAR PRESSURE TEST

	M385 MI-133-3G-A002		
By authority of Part 615 or Part 625 of Act 451 PA 1994, as amended. Non-submission and/or falsification of this information	Well name & No. Kalium Hersey No. 1013		
may result in fines and/or imprisonment.	Surface location SW 1/4 of NW 1/4 of NW 1/4, Section 26 T 17N R 09W		
Name and address of permittee Mosaic Potash Hersey LLC 1395 135th Avenue	Township County Hersey Osceola		
Hersey, MI 49639	Well type		
•	Part 615 Secondary recovery Brine disposal		
	Part 625		
Date of test	Casing Tubing		
8/1/2013	7" 29# @ 7557 feet //one		
Type of gauge PAROSCIENTIFIC MODEL 765	Packer type/model Packer depth		
•	BRIDGE PLUG 6100'		
inch face DIGITAL psi range 0-3000 New gauge ☐ Yes ☒ No	Type of non-corrosive		
New gauge ☐ Yes ☒ No if no, enter date of test calibration G 26 26 2	liquid in the annulus		
Average rate during injection	Maximum allowed injection pressure		
TEST	DATA		
1	adings (psig)		
Time Annulus tubing	Time Annulus tubing		
<u>()815</u> <u>1097.2565</u>			
0820 /097 1527			
0825 /097.0835			
C830 1097.6092	en energy during security (Se ₂)		
0835 1096.9446			
0840 1096. 9037 0845 1096. 8746			
0845 1096. 8746			
	403 1 3 253		
Comments Well PRESSURIZED TO N /124psig @ .	2:45pm 7/31/2013		
Well Pressuration of 1816	2 PSIG: 3% CHANGE: 32.9177 PSIG.		
OBSERVED PIZESSUZE CHANGE 0.00	LANCAL INTECRITY		
OBSERVED PRESSURIZED TO N 1/24PSIG @ . OBSERVED PRESSURECHANGE: 0.3819 WELL DEMONSTRATES INTERNAL MECH	ANICAC WAS DELLAY.		
, '			
Could the Kultura of the DEO			
Certification if witnessed by DEQ representative:)		
Signature of DEQ employee Taymon Olygumous Certification if not witnessed by DEQ representative: "I state that I am authority	Date 08/01/2013		
direction. The facts stated herein are true, accurate and complete to the best			
	Date		
Signature MAIL TO: OFFICE OF OIL, GAS AND MINERALS	Date		
MICHIGAN DEPARTMENT OF ENVIRONMENT	TAL QUALITY		

EQP 7606 (rev. 8/2004)

LANSING MI 48909-7756

PO BOX 30256

UNITED STATES ENVIRONMENTAL PROTECT. AN AGENCY STANDARD ANNULAR PRESSURE TEST

Operator MOSAIC POTASH HERSEY	State Permit No. M 385
Address 1395 135 7H AUE	USEPA Permit No. MI-133-36 - A002
HERSEY, MI 49639	Date of Test 8/1/2013
Well Name <u>MOSA/C 1013</u>	Well Type
LOCATION INFORMATION Quarter of	the <u>NW</u> Quarter of the <u>NW</u> Quarter
of Section 26; Range 09W; Towns	ship 17 N; County 0 SCEOLA;
Company Representative William Jacks; F	Field Inspector Bay Vyseinovich (MOSQ)
Type of Pressure Gauge Italian inch face; 0:300	psi full scale; <u>0.000</u> psi increments;
New Gauge? Yes □ No ☑ If no, date of calibration 6/24/201	Calibration certification submitted? Yes ☑ No ☐
TEST RESULTS	5-year or annual test on time? Yes □ No ☒
Readings must be taken at least every 10 minutes for a minimum of 30 minutes for Class II, III and V wells and 60	2-year test for TA'd wells on time? Yes □ No □
minutes for Class I wells.	After rework? Yes □ No 🖼
For Class II wells, annulus pressue should be at least 300 psig. For Class I wells, annulus pressure should be the	Newly permitted well? Yes □ No ☑
greater of 300 psig or 100 psi above maximum permitted	
injection pressure. Original chart recordings must be submitted with this form.	
,	
Pressure (in psig) Time Annulus Tubing	Casing size 7" 23 #
0815 1097.2565 NONE	Tubing size NonE
0820 189.1527	Packer type BRIDGE PLUB
0825 1097.0835	Packer set @ 6/00
<u>0830</u> <u>1097-0092</u> 0835 <u>1096-9446</u>	Top of Permitted Injection Zone <u>5765</u> Is packer 100 ft or less above top of
0840 1096.9037	Injection Zone? Yes ☒ No ☐
0845 1096-8746	If not, please submit a justification.
11/10-0010	Fluid return (gal.) 37 GAUGMS
	Comments:
Test Pressures: Max. Allowable Pressure Change: Ini	tial test pressure x 0.03 32.9/77 psi
	st Period Pressure change psi
Test Passed ☑ Test Failed □	
If failed test, well must be shut in, no injection can occur, an	nd LISEPA must be contacted within 24 hours
Corrective action needs to occur, the well retested, and writt	
recommence.	
I certify under penalty of law that this document and all atta	chments are, to the best of my knowledge and
belief, true, accurate, and complete. I am aware that there are	re significant penalties for submitting false ent for knowing violations. (See 40 CFR 144 32(d))

Printed Name of Company Representative Signature of Company Representative

4500 148th Avenue N. E. Redmond, WA 98052-5194 Telephone: (425) 883-8700

acsimile: (425) 867-5407 Email: support@paroscientific.com Internet:http://www.paroscientific.com

CERTIFICATE OF CONFORMANCE

CUSTOMER:	MOSAIC POTASH HERSEY		
PURCHASE ORDER:	CHARGE		
DIGIQUARTZ MODEL:	765-3K		
PART NUMBER:	1100-019-0		
SERIAL NUMBER(S):	105210		

PAROSCIENTIFIC INCORPORATED certifies that the part(s) identified above complies with the requirements of the above order and has been manufactured in accordance with engineering drawings, material and process specifications, testing procedures, and applicable specification drawing of Paroscientific Incorporated. The Digiquartz model(s) identified has been calibrated and tested over the specified pressure and temperature range and meets the requirements of the applicable specification drawing. Primary pressure, temperature standards and transfer standards used at Paroscientific Incorporated for calibration and testing have traceability to the National Institute of Standards and Technology and are regularly checked and calibrated according to Paroscientific QA Procedure Q8521, Inspection Test and Measurement Equipment, in accordance with the requirements of ISO 9001:2008.

Manus Schulman

6/26/12

AUTHORIZED SIGNATURE

DATE

Warren Schuchman, Quality Assurance Manager

Technology

Precision Pressure Instrumentation

Document no. T8148, Rev "AU", 11 Oct 2011 page 1 of 2

4500 148th Avenue N. E. Redmond, WA 98052-5194 Telephone: (425) 883-8700

acsimile: (425) 867-5407 Email: support@paroscientific.com Internet:http://www.paroscientific.com

CERTIFICATION OF TRACEABILITY TO NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY

Primary pressure and temperature standards used in the calibration and testing of Paroscientific Digiquartz Models have traceability to the National Institute of Standards and Technology through the following documentation.

Bell and Howell Primary Pressure Standard:

Bell and Howell, Model 6-201-0001, Piston/Cylinder P2-919/C2-1523 via DH Calibration Report No. 15441 and 16653 traceable to NIST. Weight Set 1, P/N 6-002-0002, via DH Calibration Report No. 14481, 16654 and 1284473284 traceable to NIST. Weight Set 2, P/N 6-002-0002, via DH Calibration Report No. 14576, 16603, 31227, 39628, 68390 and 1317389777 traceable to NIST. Piston/Cylinder P2-652/C2-1378 via DH Instruments Calibration Report No. 14575, 16602, 31226, 39627, 68389 and 1317739617 traceable to NIST. Piston/Cylinder P1-231/C1-384 via DH Instruments Calibration Report No. 13170 and 1284475131 traceable to NIST. Piston/Cylinder P/N 6-201, No. P1-949/C1-922, via DH Instruments Calibration Report 17176 and 17445, traceable to NIST.

DH Primary Pressure Standard, Oil Operated Gauge:

DH Instruments, Model 5306, Piston/Cylinder S/N 3375, via DH Calibration Certificate Report No. 8398, 22146, 32354, 45306, 66563 and 1305698573 traceable to NIST. Piston/Cylinder 3511 via DH Calibration Report No. 8399, 22147, 32353, 45307, 66562 and 1305625084 traceable to NIST. Mass Set S/N 2032 via DH Calibration Report No. 24809, 24826, 45305, 45308, 1305538925 and 1305530461 traceable to NIST.

DH Primary Pressure Standard, Pneumatic Operated Gauge:

DH Instruments, Model 5203, Piston/Cylinder S/N 4845, via DH Calibration Certificate No. 8541, 27161, 38275 and 1300177141 traceable to NIST. Mass Set S/N 2032/3293 via DH Calibration Certificate Nos.4630, 24809, 8540, 32142, 45305 and 1300200369 traceable to NIST.

DH Primary Pressure Standard, Pneumatic Operated Gauge:

DH instruments, Model PG7601 via DH Instruments Calibration No. 32162, 41492 and 69127 traceable to NIST. Piston/Cylinder S/N 305 via DH Instruments Calibration No. 20281, 32161, 41490 and 69125 traceable to NIST. DH Instruments 35 kg Mass Set No. 2052 and Bell No. 261A via DH Instruments Calibration Report No. 20282, 32163, 32164, 41491, 41493, 69126 and 69124 traceable to NIST.

Hygroclip S3 MET4/4A Part number 1560-XXX and 1561-XXX:

Humidity and Temperature calibrations are traceable to NIST through Rotronic Instrument Corporation; 160 E. Main Street, Huntington, NY 11743.

Hygroclip HC2-S3 MET4/4A Part number 1563-XXX and 1564-XXX Swiss Calibration Service (SCS)

Humidity and Temperature calibrations are traceable to SCS through Rotronic AG Grindelstrasse 6 8303 Bassersdorf Phone: 044-838-1111 E-mail: info@rotronic.ch

Digiquartz®
Technology

Art ISO9001:2008 registered company

4500 1 Avenue N. E. Facsimile: (425) 867-5407 Redmond, WA 98052-5194 Email:support@paroscientific.com Telephone: (425) 883-8700 Internet:http://www.paroscientific.com

CERTIFICATE OF CALIBRATION

DIGIQUARTZ MODEL: 765-3K SERIAL NUMBER(S): 105210

The Paroscientific Digiquantz Model (s) identified above has been calibrated and tested with one or more of the following primary pressure standards. All have traceability to the National Institute of Standards and Technology.

standar	ds. All have traceability to the National Institute of Standards	and Techno	ołogy.
	<u>l Howell Primary Pressure Standard</u> atic Absolute or Gauge Dead Weight Tester Part Number: 6	5-201-0001, t	S/N 4034 and S/N 1014
	Piston/Cylinder: 6-001-0002, P2-919/C2-1523, Weight Set 1: 6-002-0002 Range: 1.5 to 50 psi [10 to 345 kPa] Accuracy: 0.010 percent of reading		Piston/Cylinder: 6-001-0001, P1-949/C1-922, Weight Set 2: 6-002-0002 Range: 0.3 to 5 psi [2 to 34 kPa] Accuracy: 0.015 percent of reading
X	Piston/Cylinder: 6-001-0002, P2-652/C2-1378, Weight Set 2: 6-002-0002 Range: 1.5 to 50 psi [10 to 345 kPa] Accuracy: 0.010 percent of reading		
	mary Pressure Standard atic Absolute or Gauge Dead Weight Tester Part Number: F	PG7601 S/N	161
	Piston/Cylinder: S/N 305, Mass Set: S/N 2052 Range: 0.7 to 50 psi [5 to 345 kPa] absolute mode, 0.29 Accuracy: 0.002 percent of reading	9 to 50 psi [2	≀ to 345 kPa] gauge mode
	mary Pressure Standard natic Gauge Dead Weight Tester, Model 5203, S/N 5557		
	Piston/Cylinder: S/N 4845, Mass Sets: S/N 2032, S/N 3878 Range: 20 to 1,600 psi [0.14 to 11 MPa] Accuracy: 0.005 percent of reading	3293	
DH Pri	imary Pressure Standard		AEG 1.2.20 3
Oii Op	erated Gauge Dead Weight Tester, Model 5306, S/N 3505		
⊠	Piston/Cylinder: S/N 3375, Mass Set: S/N 2032 Range: 40 to 20,000 psi [0.3 to 138 MPa] Accuracy: 0.01 percent of reading above 200 psi [1.4 Nor 0.02 psi [0.14 kPa] at lower pressure	MPa]	
	Piston/Cylinder: S/N 3511, Mass Set: S/N 2032 Range: 145 to 72,500 psi [1 to 500 MPa] Accuracy: 0.02 percent of reading above 725 psi [5 MF or 0.145 psi [1 kPa] at lower pressure	Pa]	PARO
	\mathcal{T}	Nu	L TEST

Digiquartz® Pressure Instrumentation

Document No. 8145-001, Rev. P 9/22/10

Paroscientific, Inc. Pressure Instrument Configuration

SN: 105210 Part Number: 1100-019-0 Model: 765-3K

Port: Oil Filled

Calibration Date: 26-Jun-12 Report No: 14293

3 Technician: RM

Pressure Range: 0 to 3000 psia

Temperature Range: 0 to 40 deg C

Customer: Mosaic Potash Hersey

Report Date: 26-Jun-12

Address: 1395 135th Avenue

Sales Order: 30096

Hersey, MI 49639 USA

S/R Number : 10251

Conf	iguration	Calibration Coefficients
BL: 0 BR: 9600 DD: - DL: 0 DM: 0 DO: - DP: 6 ID: 07 IM: - LL: - LH: - MC: Y MD: 1 MN: 765-3K OP: - PF: 3000.000 PI: 4670 PL: 3600.000 PO: 0 PR: 238 PS: 0 AL: .0000000 AU: 3000.000 GD: 0 GT: 0 LW: 0 PC: .9999510 PX: 5 RS: 1 RU: -	PT: N QD: - QO: - SL: - SN: 105210 ST: - SU: 0 TI: 4670 TR: 952 TU: 0 UF: 1.000000 UL: UM: USER UN: 1 US: 0 VR: P1.06 ZI: 0 ZS: 0 ZL: 0 ZV: .0000000	U0: 5.813680 µsec Y1: -3958.154 deg C / µsec Y2: -13865.89 deg C / µsec² Y3: -138805.8 deg C / µsec³ C1: -14414.57 psi C2: -99.30154 psi / µsec C3: 48299.55 psi / µsec² D1: 0.0446906 D2: 0.0000000 T1: 30.00206 µsec T2: 0.820646 µsec / µsec² T4: 71.54495 µsec / µsec³ T5: 2095.804 µsec / µsec³ T5: 2095.804 µsec / µsec⁴ TC: 0.6781528 PA: -0.3538370 PM: 0.9999510

Paroscientific, Inc.

4500 148th Ave. N.E. Redmond, WA 98052

Phone: (425)883-8700 Fax: (425)867-5407

Web:http://www.paroscientific.com Email: support@paroscientific.com







UNITED STATES ENVIRONMENTAL PROTECTION AGENCY STANDARD ANNULAR PRESSURE TEST

21		1/20	
Operator MOSAIC	POTASH HERSEY	State Permit No. 438	
Address 1395	135 Th AUE	USEPA Permit No. MI-135	3-36-A002
HERSEY	MI 49639	Date of Test 12-4-2007	
Well Name KAL	10m 208Z	Well Type 177 Sour	100 Missin 6
LOCATION INFOR	MATION 5E Quarter of	the <u>NW</u> Quarter of the <u>NW</u>	Quarter
of Section 26	; Range /7/ ; Towns	ship 9n/; County 05CE	DLA;
Company Representa	ative WILLIAM Hocks; H	Field Inspector None	;
Type of Pressure Gar	age Parosejentile inch face; 0-3000	psi full scale; <u>O 000</u> psi in	ncrements;
New Gauge? Yes ⊠	No ☐ If no, date of calibration 9/10/200	7 Calibration certification submitted? Y	es ⊠ No □
TEST RESULTS		5-year or annual test on time?	
	ken at least every 10 minutes for a utes for Class II, III and V wells and 60	2-year test for TA'd wells on time?	
minutes for Class I w	vells.	After rework?	
	anulus pressue should be at least 300 lls, annulus pressure should be the	Newly permitted well?	
	r 100 psi above maximum permitted	Newly permitted well:	.03 🗆 110 🗆
injection pressure.			
Original chart record	lings must be submitted with this form.	}	
	Pressure (in psig)		
Time	Annulus Tubing	Casing size 7' 23	
	1022.714 N/A	Tubing size 3/2 D.P.	
11:40	1021.516	Packer type <u>CIBP</u> Packer set @ <u>5815</u>	
11:45	1019.423	Top of Permitted Injection Zone	5715
11:55	1017-385	Is packer 100 ft or less above to	
12:00	1016-124	Injection Zone ? Yes □ No □	
12:05	1014.956	If not, please submit a justificati	on.
		Fluid return (gal.) 3/.5	sellons
		Comments:	
Test Pressures:	Max. Allowable Pressure Change: In	itial test pressure x 0.03 30.68	psi
		est Period Pressure change 7.758	psi
Test Passed	Test Failed □		
If failed test well m	ust be shut in, no injection can occur, ar	nd USEPA must be contacted within 24	hours.
	eds to occur, the well retested, and writt		
recommence.			
Lagrify under nanel	ty of law that this document and all atta	chments are to the hest of my knowled	ge and
	e, and complete. I am aware that there a		
information, including	ng the possibility of fine and imprisonm	ent for knowing violations. (See 40 CF	R 144.32(d))
	/	1.1	
WITHTON	C Hicks Alide	? Kicks	12-4-7007
Printed Name of Co	mpany Representative Signature of C	ompany Representative	Date



STATE OF MICHIGAN

DEPARTMENT OF ENVIRONMENTAL QUALITY





DAN WYANT DIRECTOR

August 8, 2013

Mr. Doug Patulski, EHS/Minefield Superintendent Mosaic Potash Hersey 1395 135th Avenue Hersey, Michigan 49639

Dear Mr. Patulski:

SUBJECT: Mechanical Integrity Testing, Kalium Hersey No. 1013, Permit Number 385-924-767

As required by R 299.2393, of the administrative rules promulgated under authority of Part 625, Mineral Wells, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA), on Thursday, August 1, 2013, mechanical integrity testing on the subject well was conducted. I witnessed the test for the Department of Environmental Quality (DEQ). The test was not witnessed by a representative of the U.S. Environmental Protection Agency (USEPA). Internal mechanical integrity was demonstrated using an annulus pressure test. The well was off line at the time of the test; the well had been off line since prior to May 8, 2013. A retrievable bridge plug was set at 6,100 feet; the casing was pressurized to about 1124 psig at 2:45 p.m., July 31, 2013. I recorded the following casing pressures:

Time	Casing Pressure (psig)
08:15	1097.2565
08:20	1097.1527
08:25	1097.0835
08:30	1097.0022
08:35	1096.9446
08:40	1096.9037
08:45	1096.8746

The pressure change allowed by R 324.2393(4) is 54.8628 psig; a 3% pressure change is 32.9177 psig; total pressure change was 0.3819 psig. Pressure was measured using a Paroscientific digital pressure gauge supplied by Mosaic Potash Hersey, Model 765-3K, Serial No. 105210, pressure range 0 – 3000 psi; latest calibration was performed on June 26, 2012. The well demonstrates internal mechanical integrity. Use of the Kalium Hersey may be resumed at your convenience. Please note that USEPA has also issued a permit for the well and may require it to remain off line until USEPA personnel have reviewed the test results.

If you have any questions, please contact me by mail at DEQ, Office of Oil, Gas, and Minerals, P.O. Box 30256, Lansing, MI 48909, by phone at 517-241-1532, or email at vugrinovichr@michigan.gov.

Sincerely.

Raymond Vugrinovich, Senior Geologist

Minerals and Mapping Unit

cc: Ms. Lisa Perenchio, USEPA, Region V

Mr. Andy Stempky, DEQ

WU-16J

DEC 0 5 2007

CERTIFIED MAIL 7007 0710 0003 4406 5910 RETURN RECEIPT REQUESTED

Mr. Robert Schweitzer Mosaic Potash Hersey LLC 1395 135th Avenue Hersey, Michigan 49639

> Authorization to Inject into the Following Well: Kalium 2082 Injection Well, Re: Osceola County, Michigan; Class III United States Environmental Protection Agency (USEPA) Permit #MI-133-3G-0002

Dear Mr. Schweitzer:

The results of the mechanical integrity demonstration and the rework report for the well referenced above have been reviewed and found satisfactory. In accordance with permit conditions, Mosaic Potash Hersey, LLC of Hersey, Michigan is authorized to commence injection into this well.

Should you have any questions regarding the above information, feel free to contact Fredia Hardin at (312) 886-1493.

Sincerely yours,

Rebecca L. Harvey, Chief Underground Injection Control Branch

bcc: Fredia Hardin

12/5/07/Authorization to Inject Letter to MOSAIC POTASH HERSEY, LLC Hersey0002. AUT-on Fredia's F-Drive

12/5/07

Confirmation Report - Memory Send

Page : 001

Date & Time: Dec-05-07 03:13pm Line 1 : +13128864235

Machine ID: US EPA

Job number

: 628

Date

Dec-05 03:12pm

To

: 2912318323349

Number of pages

: 001

Start time

Dec-05 03:12pm

End time

Dec-05 03:13pm

Pages sent

001

Status

: OK

Job number

: 628

*** SEND SUCCESSFUL ***



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY REGIONS 5 77 WEST JACKSON BOULEVARD CHICAGO, IL 60604-3590

DEC 0 5 2007

CERTIFIED MAIL 7007 0710 0003 4406 5 RETURN RECEIPT REQUESTED

Mr. Robert Schweitzer Mosaic Potash Hersey LLC 1395 135th Avenue Hersey, Michigan 49639

Re: Authorization to Inject into the Following Well: Kalium 2082 Injection Well, Osceola County, Michigan; Class III United States Environmental Protection Agency (USEPA) Permit #MI-133-3G-0002

Pobelt Shulitzer From

Dear Mr. Schweitzer:

The results of the mechanical integrity demonstration and the rework report for the well referenced above have been reviewed and found satisfactory. In accordance with permit conditions, Mosaic Potash Hersey, LLC of Hersey, Michigan is authorized to commence injection into this well.

Should you have any questions regarding the above information, feel free to contact Fredia Hardin at (312) 886-1493.

Sincerely yours

Rebecca L. Harvey, Chief

Underground Injection Control Branch

					MY. RO.	BERT SC	HWEITTER THSH HERSEY Ch AVENUE CHIEGAN 49				
Å #			TI REVIEV	REPO	RT /	395 135 EKSEY. M	ichicaence				
WELL NAME: KALWA ASSIGNEE: PATRI	JO 8	2			ИІТ #: <u>///</u>	1-133-36	-0002				
ASSIGNEE: PATRI	CK				_ DATE:	12/4/07	,				
Company name on MIT	Mos.	Aic P	OTHSH	HE	KS 5 Y	, 110					
Is this the permittee?			(Yes)	No	,	N/A					
If "no", who is?					•						
Does the company name on the well file info?			Yes	No							
If no, then a minor modificatio authorized wells.	n of the p	permit may l	be needed or t	he file r	nay need t	o be updated f	or rule-				
Does the company name on the database info?	MIT ma	atch the	Yes	No							
If "no", then the database need				ch the e	ffective pe	rmit. If "yes"	cross out the				
database update initial line at t	he botton	n of this pag	e.		<u>-</u>						
FROM DATABASE OR WE	LL FIL	E									
Top of injection		57	165 V/A			w ground surf					
Packer depth in da	atabase:		1/8		PAC	KERLOSS	COMPLETION				
FROM MIT FORM											
Packer depth on MIT form:		5 8	315		Feet belo	w ground surf	ace				
Fluid returned after MIT:		-	1. 5		gallons						
Date of MIT :	12	14/07	Circle o	ne:	Pass Fail						
Indicate type of rework:		g repair/sque	eze job		- Commence of the Commence of						
		g/packer									
Patch at 2851		ed through prepair—spec		en . 1 7 1	/ n						
face cr crop	Not a	renair (e.g. s	timulation)s	enecify	CASING 1	FROM 2151 TE	SURFACE				
Assignee: If rework was done					ISS. If th	is was not a re	pair, and there				
was no loss of MI, enter "no lo							•				
FROM THE CIL/ATI SPRE	ADCUE	pT.									
Date of loss of MI (enter N/A			above)		12	17/07					
More than 90 days from loss o		*****			Yes	No	N/A				
T. d. 1. 1. d. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.	10 .5	0.1	• • .	1	0						
Is the packer depth within 100 If "no", the permittee must be						Y	es) No				
Was the new packer depth enter					& ICICSI.	/ V	es) No				
Give this form with the MIT, i					upplied in						
an Authorization To Inject lett	-										
Technical review completed (i	nitials)	ρ.	. S .			Date /2	15/07				
Mail out completed (initials) Date											
IF NEEDED: Well ownershi	p updated	1 in database	e (initials)			Date					
			-								



Mosaic Potash Hersey LLC 1395 135th Avenue Hersey, MI 49639 www.mosaicco.com

Tel 231-832-3755

December 5, 2007

Jeff McDonald Underground Injection Control Branch United States Environmental Protection Agency 77 W. Jackson Blvd, WU-16J Chicago, IL 60604-3590

RE:

MI-133-3G-A002

MIT on Well KCL 2082 and authorization to resume injection

The Part 1 Mechanical Integrity Test was passed on Well 2082 on December 4. 2007. The EPA did not witness the MIT per your email dated 11/28/07. Mark Smith of the Michigan Department of Environmental Quality was present to witness the test. A signed copy of the DEQ Annular Pressure Test is enclosed for your reference. The USEPA Standard Annular Pressure Test form is attached along with the calibration certification for the pressure gauge that was used.

Well 2082 lost mechanical integrity on November 6, 2007. The well has not been injected since mechanical integrity was lost. The casing leak was repaired by installing a casing patch at 2851 feet and new 7" casing was run from the patch to surface. EPA Form 7520-12 is being prepared for the rework and will be sent to you by the end of the week. Injection of Well 2082 may not resume until we receive written authorization from the EPA to resume injection.

Please review the information submitted with this letter and, as soon as possible, authorize Mosaic Potash Hersey to resume injection of Well 2082.

If I can assist you with any additional information, please contact me at 231-832-1216.

Sincerely,

Robert Schweitzer

Mining and Production Superintendent

Robert Schweitzer

Mosaic Potash Hersey

Raymond Vugrinovich, Michigan Department of Environmental Quality (no Cc: attachments)

							MB No. 20	40-0042 Expires 1/31/05				
_		<u>-</u>	UNITED STATES EN	_		ION AGENCY						
				SHINGTON, D REWORK		n						
NAME AND	ADDRESS OF	DEDMITTEE	AAELL	KENOKA		ADDRESS OF CO	NTD A OTOP					
	otash Hersey	PERMITTEE			1	tash Hersey	NIKACION					
1395 135t	h Ave				1395 135ti	•						
Hersey, M					Hersey, Mi							
			STATE	COUNTY	<u> </u>			PERMIT NUMBER				
L	ocate Well and . • Section Plat		MI SURFACE LOCATION DES	Osceola				MI-133-3G-A002				
	N		SE 1/4 of NW 1/4		Sec 26 T171	N R9W						
			LOCATE WELL IN TWO DI	CATE WELL IN TWO DIRECTIONS FROM NEAREST LINES OF QUARTER SECTION AND DRILLING UNIT								
			Surface Location 1158	ft. From (N/S)	N i	Line of Quarter Secti	ion					
And 1319 ft. From (E/W) W Line of Quarter Section												
			WELL ACTIVITY			Before Rework	TYPE OF	PERMIT				
w		E	Brine Disposal	· = ·	7678'	Delore Remork						
			Enhanced Reco			After Rework	☐ Indiv					
				•	7678'		☑ Area					
	<u>-</u>		Solution Mining	9		k Commenced	Number	of Wells 19				
╽╶┟╌╌╁╌╴	-		Lease Name		L	11/13/2007						
<u> </u>	<u>i </u>	<u> </u>	ļ		Date Rewor	k Completed						
	5		Kalium 2082	2-2022		12/5/2007	Ţ					
 	Casing	Co.	WELL CASING		BEFORE I	REWORK	Acid					
Size	Depth	Sacks	Type	From	To			Acid or Fracture reatment Record				
13 3/8	893'	900	Class A	, , , <u>, , , , , , , , , , , , , , , , </u>	<u> </u>							
9 5/8	5139'	2425	Class A									
7	7715'	680	Class H									
					<u> </u>							
	ļ		<u> </u>		<u></u>							
	<u> </u>	WELL CASING R	ECODD ACTED	DEWORK /	Indicata A	elelitions and Ci		A J 1				
	Casing		ment		orations	dordons and Ci		or Fracture				
Size	Depth	Sacks	Туре	From	To	Treatment Record						
7	7715	680	Class H		1	Cas	Casing patch Installed at 2851'					
	<u> </u>				<u> </u>							
	<u> </u>			<u> </u>			INE LOCS	LIST EACH TYPE				
1		ESCRIBE REWORK O			-			Logged Intervals				
Set bridge		JSE ADDITIONAL SH In packer in the hole to			sok at	Log Type	5	Logged Intervals				
		D, restriction at 1460'.				<u>.</u>		- 200				
		ted casing , still leaking										
		Pull 7 Inch casing and o					······································					
casing pate	th and casing. P	atch at 2851'. Land we	ilhead slips and tested	casing. Passe	d MIT.							
Test witnes	sed by Michigar	DEQ Rep Mark Smit	h. Retrieve CIBP-Run	4 1/2 casing to	6000'							
				CERTIFICAT	TION							
	I certify under	the penalty of law th	at I have personally	examined and	am familiar v	with the information	n submitted	f in this				
		i all attachments and				• •		-				
	-	believe that the infor se Information, inclu						penantes rof				
NAME AND OF	-		SIGNATURE				· · · · · · · · · · · · · · · · · · ·	DATE SIGNED				
RUBER	FICIAL TITLE RT SWH41	EITZER	ľ .	ا سيو								
PROPUS	CTION AND	MINING SU	PT. Kal	ent &	hurit	<u></u>		12/5/07				
EPA For	m 7520-12 (F	Rev. 8-01)										



12-05-2007



Fax

DATE:

12/5/07

NUMBER OF PAGES

INCLUDING COVER PAGE: 2

TQ:

Patrick Saleh, US EPA Region 5

CC:

FAX:

312-886-4235

FROM:

Bob Schweitzer

SENDER'S PHONE: 231-832-1216

Re: Permit MI-133-3G-A002 Well 2082 Rework Record

The Well Rework Record (EPA Form 7520-12) for the casing repair on Well 2082 is attached.



Mosaic Potash Hersey

Mosaic Potash Hersey LLC 1395 135th Avenue Hersey, MI 49639 www.mosaicco.com Tel 231-832-3755 Fax 231-832-3349

Fax

DATE:

12/5/07

NUMBER OF PAGES

INCLUDING COVER PAGE: 2

TO:

Patrick Saieh, US EPA Region 5

CC:

FAX:

312-886-4235

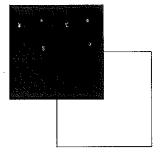
FROM:

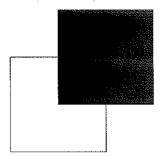
Bob Schweitzer

SENDER'S PHONE: 231-832-1216

Re: Permit MI-133-3G-A002 Well 2082 MIT

The cover letter that will be sent via FedEx today is attached for your reference. I will fax EPA Form 7520-12 (Well Rework Record) to you later today.





Fax Separator Page

**********	************	*****************	******
*###############	***************************************	. * * * * * * * * * * * * * * * * * * *	
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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY STANDARD ANNULAR PRESSURE TEST

Operator Mospic	POTASH HERSEY	State Permit No. 438	
Address /395	135 Th AUE	USEPA Permit No. MIT-133-36-1900	Z
HERSEY	MI 49639	Date of Test 12-4-2007	
Well Name	wa 208Z	Well Type 1711 Saurios Missins	<u></u>
LOCATION INFOR	MATION SE Quarter of	the NW Quarter of the NW Quarter	
of Section 26	; Range; Towns	thip 9 h); County 05CEOLA;	
	. /	field Inspector Nove;	
	4	psi full scale; <u>O OOO</u> psi increments;	
New Gauge? Yes ⊠	No □ If no, date of calibration $9/\nu/\ell\omega$	7 Calibration certification submitted? Yes ⊠ No □	
TEST RESULTS		5-year or annual test on time? Yes □ No □	
	cen at least every 10 minutes for a	•	l
minimum of 30 minum minutes for Class I w	ates for Class II, III and V wells and 60 yells	2-year test for TA'd wells on time? Yes \(\Dag{N} \) \(\Dag{O} \)	
	nnulus pressue should be at least 300	After rework? Yes ☑ No □	
-	lls, annulus pressure should be the	Newly permitted well? Yes □ No □	
greater of 300 psig of injection pressure.	r 100 psi above maximum permitted		ŧ
	lings must be submitted with this form.	·	
			,
Time o	Pressure (in psig)	Carina 1 7 72 #	
Time //: 33	Annulus Tubing	Casing size 7" 23" Tubing size 3/2 0.P.	
11:40	1021 316	Packer type CIBP	
11:45	1019-912	Packer set @ 5815	
11:50	1018.423	Top of Permitted Injection Zone <u>5765</u>	
_11:55	1017-385	Is packer 100 ft or less above top of	
12:00	1016.124	Injection Zone? Yes □ No □	
12:05	1014.956	If not, please submit a justification.	
		Fluid return (gal.) 31,5 Gellows Comments:	
Test Pressures:	Max. Allowable Pressure Change: Ini	tial test pressure x 0.03 30.68 psi	
		st Period Pressure change 7.758 psi	
Test Passed ⊠	Test Failed □		
If failed test, well m	ust he shut in no injection can occur ar	d USEPA must be contacted within 24 hours.	
	• • • • • • • • • • • • • • • • • • •	en authorization received before injection can	
recommence.	,	•	
Y£::::::	Class d 4 45 1 - 3	-hungar are to the heat of any knowledge and	
		chments are, to the best of my knowledge and re significant penalties for submitting false	
		ent for knowing violations. (See 40 CFR 144.32(d))	
	-	1	
War to the second	C thicks Alshu	17-4-72n	7
Printed Name of Co	mpany Representative Signature of Co	ompany Representative Date	•

DEQ

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY - OFFICE OF GEOLOGICAL SURVEY

ANNULAR PRESSURE TEST

ANNULAR PRE								
	Permit Number 438							
By authority of Part 615 or Part 625 of Act 451 PA 1994, as amended, Non-submission and/or falsification of this information	Well name & No. Kallum 2082							
may result in fines and/or imprisonment.	Surface location SE 1/4 of NW 1/4 of NW 1/4, Section 26 T 17N R 9W							
Name and address of permittee	Township Hersey	County Osceola						
Mosaic Potash Hersey 1395 135 th Ave		Well type						
Hersey, Mi 49639	Part 615 Secondary rec Part 625 Waste disposa	overy						
Date of test 12/4/2007	Casing 7 inch 23#	Tubing 31/2 inch Drill Pipe						
Type of gauge Paroscientific	Packer type/model	Packer depth						
inch face Digital psi range 0-3000#								
New gauge	Type of non-corrosive liquid in the annulus							
Average rate during injection	Maximum allowed injection press	Bure						
	DATA							
Pressure re Time Annulus tubing	adings (psig)	nrulus tubing						
11:35 /022#								
11:40 1021								
11:50 1018 483#								
11:35 1017.385#								
12:00 /01/2.124#								
12:03 1014.956=								
		· · · · · · · · · · · · · · · · · · ·						
	<u> </u>							
Comments								
		,						
Certification if witnessed by DEQ representative:	/							
Signature of DEQ employee Man	Date	12-4-07						
Certification if not witnessed by DEQ representative: "I state that I am author direction. The facts stated herein are true, accurate and complete to the best	ized by said owner. This report wa it of my knowledge."	s prepared under my supervision and						
Signature MAN TO OFFICE OF SEA COLORS	Date							

4500 148th Avenue N. E. Redmond, WA 98052-5194 Telephone: (425) 883-8700

Facsimile: (425) 867-5407 Email: schuchman@paroscientific.com Internet:http://www.paroscientific.com

CERTIFICATE OF CONFORMANCE

CUSTOMER:	PHE-CS-HERSHEY CENTRAL STOREROOM					
PURCHASE ORDER:	U115262					
TRANSDUCER MODEL:	765-3K					
PART NUMBER:	1100-019-0					
SERIAL NUMBER(S):	105210					

PAROSCIENTIFIC INCORPORATED certifies that the part(s) identified above complies with the requirements of the above order and has been manufactured in accordance with engineering drawings, material and process specifications, testing procedures, and applicable specification drawing of Paroscientific Incorporated The transducer(s) identified has been calibrated and tested over the specified pressure and temperature range and meets the requirements of the applicable specification drawing. Primary pressure, temperature standards and transfer standards used at Paroscientific Incorporated for calibration and testing have traceability to the National Institute of Standards and Technology and are regularly checked and calibrated according to Paroscientific QA Procedure Q8521, Inspection Test and Measurement Equipment, in accordance with the requirements of ISO 9001:2000.

Authorized Signature

9/10/07 DATE

Warren Schuchman, Quality Assurance

Technology

Precision Pressure Instrumentation

Document no. T8148, Rev "AF", 16Apr07 page 1 of 2

4500 148th Avenue N. E. Redmond, WA 98052-5194 Telephone: (425) 883-8700

Facsimile: (425) 867-5407
Email: schuchman@paroscientific.com
Internet:http://www.paroscientific.com

CERTIFICATION OF TRACEABILITY TO NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY

Primary pressure and temperature standards used in the calibration and testing of Paroscientific pressure transducers or Meteorological Systems have traceability to the National Institute of Standards and Technology through the following documentation.

Bell and Howell Primary Pressure Standard:

Bell and Howell, Model 6-201-0001, Piston/Cylinder P2-919/C2-1523 via DH Calibration Report No. 15441 and 16653 traceable to NIST. Weight Set 1, P/N 6-002-0002, via DH Calibration Report No. 14481 and 16654 traceable to NIST. Weight Set 2, P/N 6-002-0002, via DH Calibration Report No. 14576, 16603, 31227 and 39628 traceable to NIST. Piston/Cylinder P2-652/C2-1378 via DH Instruments Calibration Report No. 14575, 16602, 31226 and 39627 traceable to NIST. Piston/Cylinder P1-231/C1-384 via DH Instruments Calibration Report No. 13170 traceable to NIST. Piston/Cylinder P/N 6-201, No. P1-949/C1-922, via DH Instruments Calibration Report 17176 and 17445, traceable to NIST.

DH Primary Pressure Standard, Oll Operated Gauge:

DH Instruments, Model 5306, Piston/Cylinder S/N 3375, via DH Calibration Certificate Report No. 8398, 22146, 32354 and 45306 traceable to NIST. Piston/Cylinder 3511 via DH Calibration Report No. 8399, 22147, 32353 and 45307 traceable to NIST. Mass Set S/N 2032 via DH Calibration Report No. 24809, 24826, 45305 and 45308 traceable to NIST.

DH Primary Pressure Standard, Pneumatic Operated Gauge:

DH Instruments, Model 5203, Piston/Cylinder S/N 4845, via DH Calibration Certificate No. 8541, 27161 and 38275 traceable to NIST. Mass Set S/N 2032/3293 via DH Calibration Certificate Nos.4630, 24809, 8540, 32142, and 45305 traceable to NIST.

DH Primary Pressure Standard, Pneumatic Operated Gauge:

DH instruments, Model PG7601 via DH Instruments Calibration No. 32162 and 41492 traceable to NIST. Piston/Cylinder S/N 305 via DH Instruments Calibration No. 20281, 32161 and 41490 traceable to NIST. DH Instruments 35 kg Mass Set No. 2052 and Bell No. 261A via DH Instruments Calibration Report No. 20282, 32163, 32164, 41491 and 41493 traceable to NIST.

Hart Scientific Precision Thermometer (MET3A only):

Hart Scientific, Black Stack Model 1560 Serial Number A34523, PRT Scanner Model 2562 Serial number A34523, traceable to NIST via report number A4707031, Temperature Probe Model A1959 Serial Numbers 4424A-02, 4424A-04, 4424A-05, 4424A-06 and 5177C-02 traceable to NIST via report numbers 196a-06, 198a-06, 199a-06, 200a-06 and 183a-06.

Technology

Precision Pressure Instrumentation

Document no. T8148, Rev "AF", 16Apr07 page 2 of 2

4500 148th Avenue N. E. Redmond, WA 98052-5194 Telephone: (425) 883-8700 Facsimile: (425) 867-5407 Email:salessupport@paroscientific.com

Internet:http://www.paroscientific.com

CERTIFICATE OF CALIBRATION

TRANSDUCER MODEL: 765-3K

SERIAL NUMBER: 105210

The Paroscientific transducer(s) identified above has been calibrated and tested with one or more of the following primary pressure and temperature standards. All have traceability to the National Institute of Standards and Technology.

Bell and Howell Primary Pressure Standard

Pineumatic Absolute or Gauge Dead Weight Tester Part Number: 6-201-0001, S/N 4034 and S/N 1014

Piston/Cylinder: 6-001-0002, P2-919/C2-1523,

Weight Set 1: 6-002-0002

Range: 1.5 to 50 psi [10 to 345 kPa] Accuracy: 0.010 percent of reading

Piston/Cylinder: 6-001-0002, P2-652/C2-1378,

Weight Set 2: 6-002-0002

Range: 1.5 to 50 psi [10 to 345 kPa] Accuracy: 0.010 percent of reading

Piston/Cylinder: 6-001-0001, P1-949/C1-922

Weight Set 2: 6-002-0002 Range: 0.3 to 5 psi [2 to 34 kPa] Accuracy: 0.015 percent of reading

DH Primary Pressure Standard

Pneumatic Absolute or Gauge Dead Weight Tester Part Number; PG7601 S/N 161

Piston/Cylinder; S/N 305, Mass Set: S/N 2052

Range: 0.7 to 50 psi [5 to 345 kPa] absolute mode, 0.29 to 50 psi [2 to 345 kPa] gauge mode

Accuracy: 0.002 percent of reading

DH Primary Pressure Standard

Pneumatic Gauge Dead Weight Tester, Model 5203, S/N 5557

Piston/Cylinder: S/N 4845, Mass Sets: S/N 2032, S/N 3293

Range: 20 to 1,600 psi [0,14 to 11 MPa] Accuracy: 0.005 percent of reading

DH Primary Pressure Standard

Oil Operated Gauge Dead Weight Tester, Model 5306, S/N 3505

Piston/Cylinder: S/N 3375, Mass Set: S/N 2032 Range: 40 to 20,000 psi [0.3 to 138 MPa]

Accuracy: 0.01 percent of reading above 200 psi [1.4 MPa]

or 0.02 psi [0.14 kPa] at lower pressure

Piston/Cylinder: S/N 3511, Mass Set: S/N 2032

Range: 145 to 72,500 psi [1 to 500 MPa]

Accuracy: 0.02 percent of reading above 725 psi [5 MPa]

or 0.145 psi [1 kPa] at lower pressure

Hart Scientific Precision Thermometer (MET3A only)

Black Stack model 1560 S/N 97568, PRT Scanner model 2562 S/N A34523, Temperature Probe Model A1959: S/Ns 4424A-02, 4424A-04, 4424A-05, 4424A-06 and 5177C-02.

Range: -50° to 60° C. Accuracy: .015°C.

Digiquartz® Pressure Instrumentation Document No. 8145-001, Rev. M 4/18/07

Pressure Instrument Configuration

SN: 105210 Part Number: 1100-019-0 Model: 765-3K

Port: Oil Filled

Calibration Date: 10-Sep-07

Report No: 7548

Technician: WMR

Pressure Range: 0 to 3,000 psia

Temperature Range: 0 to +40 deg C

Customer: PHE-CS-Hershey Central Storeroom

Report Date: 10-Sep-07

Address: 1395 135th Avenue

Sales Order: 24626

Hersey, MI 49639 USA

S/R Number :

Paroscientific, Inc.

4500 148th Ave. N.E. Redmond, WA 98052

Phone: (425)883-8700 Fax: (425)867-5407

Web:http://www.paroscientific.com Email: support@paroscientific.com Prepared by



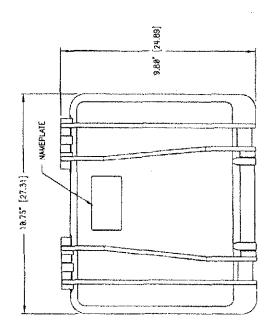


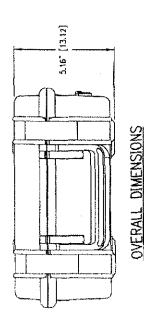
SPECIFICATION CONTROL DRAWING

NOTES

- MAXIMUM TORQUE DN VCO PRESSURE FITTING IS 75 IN—(8 (8.47 N—M). MAXIMUM TORQUE ON HIP PRESSURE FITTING IS 25 FT—(8 (33.9 N—M).
 - PETER TO OPERATION MANUAL (DOC BR85--E81) FOR OPERATING INSTRUCTIONS.
- CAUTION: UNT 15 A SCIENTIFIC INSTRUMENT. EXCESSIVE SHOCK MAY CAUSE PERMANENT DAMAGE. HANDLE WITH CARE.
- ACCESSORIES INCLIDE: USB INTERFACE CABLE, OPERATING MANUAL, UNIVERSAL AC ADAPTER, DIGIOJARTZ® LIBRARY CO, AND LAMINATED MENU CARO. ALL VCO UNITS SHIPPED WITH 1/4" TUBING ADAPTER(\$)
- OIL-FILLED UNITS ARE FILLED UNDER VACUUM BY THE MANUFACTURER WITH DOW-CORNING FS 1265 FLUID. (AT 25°C, SPECIFIC GRAVITY = 1.25 AND VISCOSITY = 300 CENTSTOKES).
- CAUTION: 00 NOT APPLY VACUUM OR GAS TO DIL-FILLED PRESSURE PORTS. OIL COULD BE WITHORAWN, PERMITTING PRESSURE MEDIUM TO COME MID CONTACT WITH SENSING ELEMENTS.
- PRODUCT IS CE CERTIFIED.

RS-232 PORT METS EIA/TIA-232 SPECIFICATIONS.





PRODUCT STANDARD

													_			7									T	_		٦
MATING FITTING		1/4" SMAGELOK VCD														HIP CLAND 58-2HM4	COLLAR 58-274	APPER HIM	OK AUTOCLANE:	CONTRACTOR	WINDLE SO(18)	אונידנג מין דטן		C.S.C. 200 (2018) 2 47 7	1/4 SMALELUK VLD			
OPERATING TEMP RANGE		-28 °C TO +50 °C (-4 °F TO +122 °F) 8 °C TD +40 °C (32 °F TO +104 °F)																										
ACCURACY	BROBE OF F.S. OR BETTER	±0.08 hPs OR BETTER									A BOAZ OF F.S. OR BETTER															8.82% OF F.S. OK EKILEK		-
PRESSURE RANGE	8-15 PSIA (0.18 MPa)		8-23 PSIA (9.15 MPz)		8-45 PSIA (0.31 MPa)	8-186 PSIA (8.59 MPa)	0-200 PSIA (1.38 MPa)		8-400 PSIA (2.76 MPs)	8-598 PSIA (3.45 MPa)	_	8-22 PSIC (8.15 MPa)	8-38 PSIG (8.21 MPa)		8-158 PSIC (1.83 MPa)	8~266 PSIC (1.38 MPa)	-1068 PSIA (6.09 MPa)		0-3068 PSIA (28.7 MPa)	-6989 PSIA (41.4 MPa)	1188-821-8 8-18888 PSIA (58.9 MPa)	1188-822-8 8-15888 PSIA (183 MPa)	-28888 PSIA (138 MPa)	1186-624-6 6-30666 PSM (287 MPa)	8-40080 PSIA (275 MPa)	0-3 PSID (0.020 MPa)	8-6 PSID (6.841 MPa)	(edu Cra) niza at-a
PART NO	†-			1108-063 8	11Be-864 B	1186-885 8	1100-805 0	1188-897	1186-688 8	1189-99	1188-811	1188-612	1188-013	1198-914 8	1188-015	1186-016	1186-817-6 6-1868 PSIA	1188-818-8 8-2088 PSIA	1136-619-6	1189-629-6 8-6988 PSIA	1189-621-6	1166-622-6 8	1189-023-0 6-2000 PSIA	1186-924-8 8	1190-025-8 8	_	1186-627	T 190 008
ON BUOM	765-158	765-168	765-23A	765-38A	765-45A	765-1 BBA	765-288A		765-488A	765-588A	765-156	765-226	765-380	765-1886		765-2886	765-1K	765-2K	765-3K	7656K	765-19K	765-154	765-28K	765-38K	7654BK	765-30	76560	CO. 127

L_ ADD "-8" FOR OIE-FILLED, 1K PSIA TD 40K PSIA ONLY

PERFORMANCE

ACCURACY RELATIVE TO THE PRIMARY STANDARD INCLUDES RESOLUTION, HYSTERESIS, NON-REPEATABILIT, AND NON-CONFORMANCE SEE TABLE

DIFFERENTIAL MODELS:

<0.00057, OF F.S./PSI OF COMMON MODE PRESSURE 1200 PSI COMMON MODE ERROR COMMON MODE PRESSURE, MAX

CHARACTERISTICS

POWER REQUIREMENTS (WITH SUPPLIED AC ADAPTER) 100-248 VAC, 47-63 Hz (OPERATES UP TO 150 HOURS ON BUILT-IN RECHARGEBLE BATTERY) .. 8.5 LB (3.86 KG) TYPICAL WEIGHT

DISPLAY IS 16 CHARACTER X 2 ROW LCD WITH .32 IN. HIGH CHARACTERS.

ENARGY MENTAL

1.2 TIMES FULL SCALE
1.8 TIMES FULL SCALE
1.1 TIMES FULL SCALE OVERPRESSURE
MODEL 765-508A
MODEL 765-308 AND 765-40K

SEE TABLE DPERATING TEMPERATURE RANGE

(4, 921+ 01 d. m-) 3, 88+ 01 3, 85-AC ADAPTER OPERATING TEMPERATURE RANGE 8 °C TO +40 °C (32 °F TO +104 °F) STORAGE TEMPERATURE RANGE

		Т	¥
_	ğ c	D	EMITIC 8
OM DIGIQUARIZ® PORTABLE PRESSURE STANDARD MODEL 765	TO Z Z DO 4	ו מאם - כניסו	CHELL SHELL I OF BROSO
SCHIPTION PORTAB	CUG F.H. F. Z.C.	242	NON-
<u> </u>	S <	۲	3
AMP Paroscientific, Inc.	UMESS OTHERWISE SPECIFIED	LA OF THE MICHIGAN MENONETS ARE IN CENTIMETERS.	ACAD FILENAME: 765\7833-001_D
avo avo	1/10/01	121,104	35
CURRENT APPROVALS NAME DATE NAME DOD D. Calland, 11/29/AR MY D. Calland, 11/29	The Wall Black	Defluxon 11/22/cull	ED NO/EFFECTIVE DATE -

Form A wed OMB No. 2040-0042 Expires 1/31/05 TED STATES ENVIRONMENTAL PROTECTION AGE LEY WASHINGTON, D.C. 20460 WELL REWORK RECORD NAME AND ADDRESS OF PERMITTEE NAME AND ADDRESS OF CONTRACTOR Mosaic Potash Hersey Mosaic Potash Hersey 1395 135th Ave 1395 135th Ave Hersey, Mi 49639 Hersey, Mi 49639 STATE COUNTY PERMIT NUMBER Osceola Locate Well and Outline Unit on MI MI-133-3G-A002 Section Plat - 640 Acres SURFACE LOCATION DESCRIPTION N SE 1/4 of NW 1/4 of SW 1/4 of Sec 26 T17N R9W LOCATE WELL IN TWO DIRECTIONS FROM NEAREST LINES OF QUARTER SECTION AND DRILLING UNIT 1158 ft. From (N/S) N Location Line of Quarter Section And 1319 ft. From (E/W) W Line of Quarter Section WELL ACTIVITY Total Depth Before Rework TYPE OF PERMIT W Brine Disposal E 7678' Individual Total Depth After Rework Enhanced Recovery ✓ Area 7678' Solution Mining 19 Date Rework Commenced Number of Wells Lease Name 11/13/2007 Date Rework Completed 5 Kalium 2082 12/5/2007 WELL CASING RECORD - BEFORE REWORK Casing Cement Perforations Acid or Fracture Size Depth Sacks Treatment Record Туре From To 13 3/8 893' 900 Class A 9 5/8 5139 2425 Class A 7 7715 680 Class H WELL CASING RECORD - AFTER REWORK (Indicate Additions and Changes Only) Casing Cement Perforations Acid or Fracture Size Depth Sacks Type From To Treatment Record 7 7715 680 Class H Casing patch installed at 2851' WIRE LINE LOGS, LIST EACH TYPE DESCRIBE REWORK OPERATIONS IN DETAIL **USE ADDITIONAL SHEETS IF NECESSARY** Log Types Logged Intervals Set bridge plug at 5815'-Run packer in the hole to determine depth of the leak. Found leak at 6' below wellhead. Found I.D. restriction at 1460'. Cut 7 inch casing at 1520' and ran casing patch and new casing. Tested casing, still leaking. Pulled more tension on the casing patch. 7 inch seperated at 2850. Pull 7 inch casing and dress 7 inch for a new patch. Run new casing patch and casing. Patch at 2851'. Land wellhead slips and tested casing. Passed MIT. Test witnessed by Michigan DEQ Rep Mark Smith. Retrieve CIBP-Run 4 1/2 casing to 6000' CERTIFICATION I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (Ref. 40 CFR 144.32) NAME AND OFFICIAL TITLE ROBERT SCHWEITZER Robert Sheverty

PRODUCTION AND MINUNG SUPT. EPA Form 7520-12 (Rev. 8-01)

BEOLOGICAL SURVEY

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્રાહેમ જીવી મજી જેન્જ New # દેશ માટે ઘર માટે ઘર જ	Permit Number 438							
By authority of Part 615 or Part 625 of Act 451 PA 1994, as amended. Non-submission and/or falsification of this information	Well name & No. Kalium 2082							
may result in fines and/or imprisonment.	Surface location SE 1/4 of NW 1/4 of NW 1/4, Section 26 T 17N R 9W							
Name and address of permittee	Township Hersey	County Osceola						
Mosaic Potash Hersey 1395 135 th Ave		Well type						
Hersey, Mi 49639	Part 615 Secondary red Part 625 Waste dispos							
Date of test 12/4/2007	Casing 7 Inch 23#	Tubing 31/2 inch Drill Pipe						
Type of gauge Paroscientific	Packer type/model	Packer depth						
inch face Digital psi range 0-3000#		·						
New gauge Yes No	Type of non-corrosive							
if no, enter date of test calibration Average rate during injection	Ifquid in the annulus Maximum allowed injection pres	sure						
TEST	T DATA							
	eadings (psig)	4						
Time Annulus tubing	Time A	nnulus tubing						
11:35 /022# 11:40 /021#								
11:45 1038#								
11:50 1018 483#								
11:55 1017,385#								
12:00 1016.124#								
12:05 1014.956=								
		· ·						
	(1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-							
Comments								
		*						
Certification if witnessed by DEQ representative:								
Signature of DEQ employee Mad J. Smith	Date	12-4-07						
Certification if not witnessed by DEQ representative: "I state that I am authorized direction. The facts stated herein are true, accurate and complete to the be	ofized by said owner. This report wast of my knowledge."	as prepared under my supervision and						
Signature	Date							

Date



STATE OF MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY LANSING



September 22, 2006

SEP 29 2006

UIC BRANCH EPA REGION 5

Mr. Bob Sweitzer Minefield Supervisor Mosaic Potash Hersey LLC 1395 135th Ave. Hersey, Michigan 49639

Dear Mr. Sweitzer:

SUBJECT: Mechanical Integrity Testing, Kalium 2031, Permit No. 383-914-767

As required by R 299.2391(2) of the administrative rules promulgated under authority of Part 625, Mineral Wells, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as a amended (NREPA), on Friday, September 22, 2006, mechanical integrity testing on the subject well was conducted. A bridge plug has been set in the well at 6801 feet and cement placed on top of the bridge plug prior to converting the well to mine the Salina F Unit salt. The top of the cement was tagged at 6670 feet. The casing has been under pressure since last week, according to Mr. Bill Hicks of Mosaic, USA. Internal mechanical integrity of the 7-inch long string casing was demonstrated using a pressure test. I witnessed the test for the Michigan Department of Environmental Quality. The test was not witnessed by a representative of the United States Environmental Protection Agency. I recorded the following pressures:

Time	Annulus Pressure (psig)
08:59	951.817
09:04	951.814
09:09	951.814
09:13	951.811
09:18	951.808
09:23	951.792
09:28	951.779
09:33	951.769
09:38	951.758
09:43	951.751
09:48	951.748
09:53	951.743
09:59	951.743
	· ·

Pressure was measured by a Paroscientific 0 - 2000 psi digital quartz pressure standard, model 760-2K, serial number 54710, last calibration 5/14/1999, supplied by Mosaic USA, LLC.

Mr. Bob Sweitzer Page 2 September 22, 2006

The test well appears to demonstrate internal mechanical integrity as required by R 299.2391(2) of the NREPA.

If you have any questions about the above, please contact me.

Sincerely,

Raymond Vugrinovich

Senior Geologist

Minerals and Mapping Unit Office of Geological Survey

517-241-1532

cc: Ms. Lisa Perenchio, Chief, Direct Implementation Section, U.S. EPA

Mr. Rick Henderson, DEQ Mr. Mel Kiogima, DEQ

ENT OF ENVIRONMENTAL QUALITY - OFFICE:

EOLOGICAL SURVEY

ANNULAR PRESSURE TEST Permit Number 383-914-76 MI-133-3G-A0002 By authority of Part 615 or Part 625 of Act 451 PA 1994, as amended. Well name & No. Non-submission and/or falsification of this information Kalium 2031 may result in fines and/or imprisonment. Surface location 1/4 of NE 1/4 of SW 1/4, Section 26 T 17N R 09W Name and address of permittee Township County Mosaic USA LLC Hersey Osceola 1395 135th Avenue Well type Hersey, MI 49639 Part 615 Secondary recovery Brine disposal Part 625 Waste disposal Solution mining Date of test Casing Tubing 10/22/2006 7" 23# N-80 @ 7808 feet None PAROSCIENTIFIC DIGITAL QUARTZ PRESSURE STANDARD, MODEL 760-ZIK SN 5470 Packer type/model Type of gauge Packer depth None inch face psi range 0-2000 ⊠ No New gauge Yes Type of non-corrosive No annulus if no, enter date of test calibration liquid in the annulus Average rate during injection Maximum allowed injection pressure **TEST DATA** Pressure readings (psig) Time Annulus tubing Tîme Annulus tubing 951 817 0859 951.814 *0*904 951.814 0909 951.811 <u>0913</u> 0918 951.808 0923 951.792 09 28 951.779 0933 951-769 951.758 0938 951.751 <u>09 43</u> 951 748 951.743 Comments Well was plugged back to prepare for mining of Salina F Unit salt; bridge plug at 6801 feet - cement on top; top of cement tagged at 6670 feet. Certification if witnessed by DEQ representative: 9/22/2006 Signature of DEQ employee Date manc Certification if not witnessed by DEQ representative: "I state that I am authorized by said owner. This report was prepared under my supervision and direction. The facts stated herein are true, accurate and complete to the best of my knowledge."

> MAIL TO: OFFICE OF GEOLOGICAL SURVEY

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

Date

PO BOX 30256

LANSING MI 48909-7756

Signature

4500 148th Avenue N. E. Redmond, WA 98052-5194 Telephone: (425) 883-8700

Facsimile: (425) 867-5407
Email: salessupport@paroscientific.com
Internet: http://www.paroscientific.com

CERTIFICATE OF CONFORMANCE

CUSTOMER:	IMC KALIUM, LTD.	
PURCHASE ORDER:	N/A	
TRANSDUCER MODEL:	760-2K	
PART NUMBER:	1107-033-0	
SERIAL NUMBER(S):	54710	

PAROSCIENTIFIC INCORPORATED certifies that the part(s) identified above complies with the requirements of the above order and has been manufactured in accordance with engineering drawings, material and process specifications, testing procedures, and applicable specification drawing of Paroscientific Incorporated. The transducer(s) identified has been calibrated and tested over the specified pressure and temperature range and meets the requirements of the applicable specification drawing. Primary pressure standards and transfer standards used at Paroscientific Incorporated for calibration and testing have traceability to the National Institute of Standards and Technology and are regularly checked and calibrated according to Paroscientific QA Procedure Q8521, Inspection Test and Measurement Equipment, in accordance with the requirements of ISO 9001.

Conald to Homoon

5/14/99

AUTHORIZED SIGNATURE

DATE

Donald H. Hanson, Director of Engineering and Quality Assurance

-Digiquartz® Pressure Instrumentation

Document No. T8148, Rev."J", 9Feb99

Page 1 of 2

PAROSCIENTIFIC, INC. 4500 148th Ave. N.E. Redmond, WA 98052 Tel: (425) 883-8700 Fax: (425) 867-5407

Customer:

IMC KALIUM LTD. 1395 135TH AVENUE HERSEY, MI 49639

Date:

04-09-1999

Sales Order: 15583 S/R 5758

STATUS REPORT OF INTELLIGENT TRANSMITTER

Serial Number: 54710 Model: 760-2K

Pressure Range: 0 to 2000 psia

oil filled

Calibration Coefficients Configuration _____

VR: 60.07 PA: .0000000 SN: 54710 PM: 1.000000 TC: .6890874 ID: 01 BR: 9600

PT: N UO: 5.889979 Y1: -3914.328 DP: 6 Y2: -12187.81

Y3: -72768.38 MD: 1

MC: Y C1: -8358.509 C2: -626.9729 C3: 19397.85 UN: 1

UF: 1.000000 PR: 00238 D1: .0538819 TR: 00952 D2: .0000000

OP: 2100.000 T1: 29.98964

ZS: 0 T2: -.0372625 T3: 47.63067 ZV: .0000000 T4: 73.49568 T5: 729.2003

Prepared by: T.Chau

4500 148th Avenue N. E. Redmond, WA 98052-5194

Facsimile: (425) 867-5407 Email: salessupport@paroscientific.com Telephone: (425) 883-8700 Internet: http://www.paroscientific.com

CERTIFICATION OF TRACEABILITY NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY

Primary pressure standards used in the calibration and testing of Paroscientific pressure transducers have traceability to the National Institute of Standards and Technology through the following documentation.

Bell and Howell Primary Pressure Standard:

Bell and Howell, Model 6-201-0001, Piston/Cylinder P2-919/C2-1523 via DH Calibration Report No. 15441, traceable to NIST via test report numbers M4212 and 822/255136-95. Weight Set 1, P/N 6-002-0002, via DH Calibration Report No. 14481, traceable to NIST via test report numbers M4212, TN-251820-93 and 822/255136-95. Weight Set 2, P/N 6-002-0002, via DH Calibration Report No. 14576, traceable to NIST via test report numbers M4212, TN-251820-93 and 822/255136-95. Piston/Cylinder P2-652/C2-1378 via DH Instruments Calibration Report No. 14575, traceable to NIST via test report numbers M4212 and 822/255136-95. Piston/Cylinder P1-231/C1-384 via DH Instruments Calibration Report No. 13170, traceable to NIST. Piston/Cylinder P/N 6-201, No. P1-949/C1-922, via DH Instruments Calibration Report 15440, traceable to NIST via test reports M4212 and 822/255136-95.

DH Primary Pressure Standard, Oil Operated Gauge:

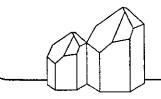
DH Instruments, Model 5306, Piston/Cylinder S/N 3375, via DH Calibration Certificate No. 8398 via National Bureau of Standards Reports M4212 and 822/255136-95. Piston/Cylinder 3511 via DH Calibration Report No. 8399 and via NIST reports M4212 and 822/255136-95. Mass Set S/N 2032 via DH Calibration Report No. 4630 and via test report numbers M4212, TN-251820-93 and 822/255136-95.

DH Primary Pressure Standard, Pneumatic Operated Gauge:

DH Instruments, Model 5203, Piston/Cylinder S/N 4845, via DH Calibration Certificate No.8541, via National Bureau of Standards Reports M4212 and 822/255136-95. Mass Set S/N 2032/3293 via DH Calibration Certificate Nos.4630 and 8540 and via National Bureau of Standards Reports M4212. TN-251820-93 and 822/255136-95.

DH Primary Pressure Standard, Pneumatic Operated Gauge:

DH instruments, Model PG7601, Piston/Cylinder S/N 305 via DH Instruments Calibration No. 7168, traceable to NIST via test reports M4212, TN-251820-93 and 822/255136-95. DH Instruments 35 kg Mass Set No. 2052 via DH Instruments Calibration Report No. 7210, via traceable to NIST via test reports M4212, TN-251820-93 and 822/255136-95.



4500 148th Avenue N. E. Redmond, WA 98052-5194 Telephone: (425) 883-8700

Facsimile: (425) 867-5407 Email: salessupport@paroscientific.com

Internet: http://www.paroscientific.com

CERTIFICATE OF CALIBRATION

TRANSDUCER MODEL: 760-2K

SERIAL NUMBER: 54710

The Paroscientific transducer(s) identified above has been calibrated and tested with one or more of the following primary pressure standards. All have traceability to the National Institute of Standards and Technology.

Bell ar	ad Howell Primary Pressure Standard
	atic Absolute or Gauge Dead Weight Tester umber: 6-201-0001, S/N 4034 and S/N 1014
	Piston/Cylinder: 6-001-0002, P2-919/C2-1523, Weight Set 1: 6-002-0002 Range: 1.5 to 50 psi [10 to 345 kPa] Accuracy: 0.010 percent of reading
	Piston/Cylinder: 6-001-0002, P2-652/C2-1378, Weight Set 2: 6-002-0002 Range: 1.5 to 50 psi [10 to 345 kPa] Accuracy: 0.010 percent of reading
	Piston/Cylinder: 6-00'1-0001, P1-949/C1-922, Weight Set 2: 6-002-0002 Range: 0.3 to 5 psi [2 to 34 kPa] Accuracy: 0.015 percent of reading
DH Pri	mary Pressure Standard
	atic Absolute or Gauge Dead Weight Tester
Part N	umber: PG7601 S/N 161
	Piston/Cylinder: S/N 305, Mass Set: S/N 2052 Range: 0.7 to 50 psi [5 to 345 kPa] absolute mode, 0.29 to 50 psi [2 to 345 kPa] gauge mode Accuracy: 0.002 percent of reading
DH Pri	mary Pressure Standard
Pneum	atic Gauge Dead Weight Tester, Model 5203, S/N 5557
<u></u>	Piston/Cylinder: S/N 4845, Mass Sets: S/N 2032, S/N 3293 Range: 20 to 1,600 psi [0.14 to 11 MPa] Accuracy: 0.005 percent of reading
DH Pri	mary Pressure Standard
Oil Op	erated Gauge Dead Weight Tester, Model 5306, S/N 3505
/	Pietro /Culin I. CAL 2275 M. G. CAL 222

Piston/Cylinder: S/N 3375, Mass Set: S/N 2032

Range: 40 to 20,000 psi [0.3 to 138 MPa]

Accuracy: 0.01 percent of reading above 200 psi [1.4 MPa]

or 0.02 psi [0.14 kPa] at lower pressure

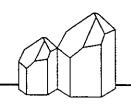
Piston/Cylinder: S/N 3511, Mass Set: S/N 2032

Range: 145 to 72,500 psi [1 to 500 MPa]

Accuracy: 0.02 percent of reading above 725 psi [5 MPa]

or 0.145 psi [1 kPa] at lower pressure

Date: 5-14-99





UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 5 77 WEST JACKSON BOULEVARD CHICAGO, IL 60604-3590

DEC 2 2 2004 DFC 2 2 2004

REPLY TO THE ATTENTION OF: WU-16J

CERTIFIED MAIL 7001 0320 0006 1560 5163 RETURN RECEIPT REQUESTED

Mr. Robert Schweitzer IMC Potash Hersey 1395 135th Avenue Hersey, Michigan 49639

Subject:

Results of Water-Brine Interface Test of Well # 1054 in June of 2004

United States Environmental Protection Agency permit MI-133-3G-A002

Dear Mr. Schweitzer:

Region 5's Underground Injection Control Branch has reviewed the results of the water-brine interface test of Well #1054 which was completed on July 3, 2004. The test was conducted properly and our analyses confirms the conclusions presented.

The procedures used resulted in collection of usable data. We have reviewed these data and find that the purposes of the regulations or permit conditions requiring these tests appear to have been met. However, much of the data that must have been collected were not reported. Time and pressure data corresponding to empty spaces on the enclosed form (History of Brine Displacement and Pressure Change During Displacement) which we use to confirm test results should also be reported. Although we accept the results of the test, this does not mean that we agree with all interpretations provided nor that future analysis may not identify some cause for concern. A summary of the results of our review is enclosed.

We are providing the following table in order to assist you in complying with your permit and planning future testing. We could not find an external demonstration of the integrity of the well bore carried out within the last five years for this well. We extended the search to all of the Class III wells and found only a few temperature logs which are now eight or nine years old. The permit for these wells requires a mechanical integrity test pursuant to Title 40 of the Code of Federal Regulations 146.8(a)(2), at intervals no longer than five years. Therefore, they are not in compliance with the area permit or with the UIC regulations. Please review your records. If we are in error, please provide us with copies of the most recent external demonstrations of mechanical integrity for each of the wells operated under area permit MI-133-3G-A002. If some of the Class III wells under this permit have not had external demonstrations within the past five years or ever, arrange for making these demonstrations within the next 60 days and submit the results to our office.

TEST TYPE	WELL NAME	LAST TEST	FREQUENCY	TEST DUE DATE
Internal MIT		1	within 1 year of last test	
External MIT			within 5 years of last test	La Salidi Arriy

If you have any questions or comments about either the contents of this letter or our interpretation of the tests run, please contact me at (312) 353-6288.

Sincerely yours,

/ Jeffrey R. McDonald, Geologist

Underground Injection Control Branch

Enclosure

bcc:

H. Gerrish

P. Saieh

P. Blakley

C. Brown/S. Williams; TSA, Inc. c/o Talib Syed

Well file: MI-133-3G-A002

WU-16J:December 22, 2004

G:\UIC\Class3\1054 MIT ok 2004 hg.wpd

P.S. 12/22/04

<u> </u>	REVIE	W AND CHE	CK OF WAT	ER-BRINE IN	TERFACE TES	T DATA	
Facility Name				Operator	****		
Hersey				IMC Potash He	ersey, Inc.		
Well Name			Field Name		USEPA Permit Numb		
#1054					MI-133-3G-A00	02	
County			State	Test Date	Reviewer	Review Date	
Osceola			<u> </u>	07/03/2004	Gerrish	12/14/2004	
			st and Refere	ence Well Info			1000000
	Casing Volume, g			Starting SG	Vol. to Inject, gals.		Reference Well No.
7839	1.6535	6200		1.218	7210		1051 tubing
Casing OD, in	Prop. Interface De			Test Liquid	Calc. Pressure, psi		Specific Gravity
7.000	7458	4.5		Water	491	•	1.218
	Flushed Casing?		/ft	Specific Gravity	Calc. Interface Depth	ft	Measured Pressure
23	Yes	0.8261		1.066	7451		562
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	·	ntonialinantononananonanialininanananji (anglessiganise)		rine Displacer			
Maximum I			THE RESERVE THE PROPERTY OF THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NAMED IN COLU	t of less than 20			
	DATE	TIME	1	PRESSURES, psi	DIFFERENCE	CHANGE	APPROX RATE
		hr:min	TEST WELL	REFERENCE	psi	psi	ft/min
Start	06/29/2004	12:00	572.771	508,612	64.159		
		Pressi	ure Change	During Displac	ement, psi		
Desired Dif	ference in Pr	essure Meas	surements	490.969	Implies interfa	ce is at, ft	7458
Measured Difference in Pressure Measurements 0			Implies interfa	ce is at, ft			
	ls		within 50 fee	et of the total ca	sing length?		
	Pr	essure Mea	Water-Automotive Committee	During Temper		ation	
	DATE	TIME	PRESSURE				
Start		00:00	0.000	0			
					 	 	-
	-		+				+
Measured	⊥ Difference aft	er Tempera	ture Equilibra	tion	490.49		7451
Modelica	DATE	TIME		D PRESSURES	DIFFERENCE	CHANGE	CHANGE
	DATE	hr	TEST WELL	REFERENCE	4		
C1	07/00/0004				psi 490,49	psi 	psi/hr
Start	07/02/2004	16:00	1052.490	562.000	+		
2 hours	07/02/2004	18:00	1052.740	562.334	490.406	-0.084	-0.042
4 hours	07/02/2004	20:00	1052.600	562.022	490.578	0.172	0.086
6 hours	07/02/2004	22:00	1052.280	562.037	490.243	-0.335	-0.167
8 hours	07/03/2004	00:00	1052.780	562.186	490.594	0.351	-0.016
	TOTAL	08:00			TOTAL	0.104	0.013
			TEST (DUTCOME			
Pressure C	hange, psi/h	our			0.013		
B	of Interface,		is downward)	-1.580		
	akage, gals/h			,	-0.327	Ī	
If pressure change is less than 0.05 psi/hr, PASS			PASS	-			
Comments		oo aran o.oo	P30111, 1 240C		11 2 2 2 2 2 2	Ш	
	•						

The information submitted was incomplete. All of the time and pressure data gathered should be submitted. The form of the submission made finding the data to fill in this worksheet easy, but without all of the data, we feel less certain that the steps described were carried out. In the future, the pressures measured during fill up and temperature stabilization and the times of measurement should be included.



1395 135th Avenue

Hersey, Michigan 49639

Telephone: (231) 832-3755

Fax: (231) 832-3349

RECEIVED

July 7, 2004

Jeff McDonald
Underground Injection Control Branch
United States Environmental Protection Agency
77 E. Jackson Blvd, WU-16J
Chicago, IL 60604-3590

RE:

MI-133-3G-A002

IMC Potash Hersey 1054 MIT

IME Potash Hersey has performed a successful Mechanical Integrity Test on our Class III solution mining well 1054 using the "Water-Brine Interface" method. Enclosed are the results of the test for both the test and reference wells.

We respectfully request acknowledgement of EPA acceptance of these test results.

If I can assist you with any additional information, please contact me at 231-832-1216.

Sincerely,

Robert Schweitzer

Production Superintendent

Lobert Schweitzer

ICM Potash Hersey

Cc:

Raymond Vugrinovich, Michigan Department of Environmental Quality

Cc:

Robb Aultman, General Manager Hersey



IMC Potash Hersey

WATER-BRINE INTERFACE MECHANICAL INTEGRITY TEST WELL INFORMATION

Test Well No:	1054	
Location, Section, Township, Range	Cluster 1 Sec26 T1	7N R09W
County, State	Osceola, Michigan	
Casing Size	7	inches
Depth of Intact Casing	7839	measurement
Tubing Size	4 ½	inches
Tubing Depth	6200	measurement
Packer Cup Mandrel Depth (Top)	none	measurement
Liner Size	none	inches
Liner Interval	none	measurement
Depth of A-1 Salt (Top)	7807	measurement
Depth of A-1 Salt (Top)	7487	TVD
Depth of Borgen Bed (Top)	7836	measurement
Depth of Borgen Bed (Top)	7508	TVD
Logged Depth of Cavity (Top)	7836	measurement
Capacity of Casing	1.6534	gal/ft
Capacity of 4 ½ x 7 Annulus	.8272	gal/ft
Capacity of Liner	.6528	gal/ft
Capacity of Well from Surface to 50'above Borgen	11225	gal
Used for Injection or Return	Injection	
Normal Operating Pressure	1200	psi
Reference Well No:	1051	
Capacity of Reference Well from surface to cavity	11360	gal
No. of Wells in Cavity	2	

Complied by:	Bill Hlcks
Date:	6-21-04

WATER-BRINE INTERFACE MECHANICAL INTEGRITY TEST PRESSURE INSTRUMENTATION INFORMATION

	TEST WELL NO. 1054	REFERENCE WELL NO. 1051
Manufacturer	Paroscientific Inc.	Paroscientific Inc.
Туре	Digiquartz Portable Standard	Digiquartz Portable Standard
Port No.	1107-033-0	1107-033-0
Model No.	760 – 2K	760 – 2K
Serial No.	47973	54710
Accuracy %FS	0.01%	0.01%
Precision, psi	0.001 psi	0.001 psi

Complied by:	Bill Hicks	
Date:	6-21-04	

PROCEDURE REPORT, PAGE ONE

See Standard Operating Procedure (leb 121, dated 9/10/93)

1. Inject water or under saturated brine in test well to remove crystallized salt and pressurize the cavity.

Date	6-29-04	
Time	10:15 hrs	
Name	Dewayne Hamilton	
Quantity Injected	12000 gal.	
Saturation	0%	

2. Return brine from the test well to establish a constant specific gravity.

6-29-04	
12:30	
Dewayne Hamilton	
12000	
1.180	
572.771	
508.612	***
	12:30 Dewayne Hamilton 12000 1.180 572.771

3. Return brine from the reference well and establish a constant specific gravity.

Date	6-29-04	
Time	1800	
Name	Dewayne Hamilton	
Quantity Returned	10000 Gal.	
Specific Gravity at end of Return	1.218	
Shut in Pressures:		
1054 Test Well	534.040	
1051 Reference Well	421.647	

4. Inject water or oil in test well to establish interface.

a) Calculate injection rates:

Depth	0 to6200	6200-	to	То
i-		7508		
Casing or Annulus size	7"23# X 4 ½"	7" 23#		
Capacity, gal/ft	.8272	1.6534		
X Max. Velocity	20 ft/min	20 ft/min	20 ft/min	20 ft/min
= Max. Inj. Rate	16.5 GPM	33.1	GPM	GPM
, l		GPM		
Capacity This Interval	5128 gal	2162 gal		***
Capacity From Surface	5128 gal	7291Gal		
to Bottom of Interval	_			

b) Calculate Target Differential Pressure:

Differential Pressure = $(TVD-50) \times (S.G.1 - S.G.2)$

 $= (7508 - 50) (1.218 - 1.066) \times .4331$

= 490.96

WATER-BRINE INTERFACE MECHANICAL INTEGRITY TEST

PROCEDURE REPORT, PAGE TWO See Standard Operating Procedure (leb 121, dated 9/10/93)

4b. Contd.

Interface Placement Injection Record

		interface Placem	ent Injection Re	cord	
Date	Time	Ву	S.G.	GPM	Differential
6-3004	12:00	Bill Hicks	1.066	16.5	GPM 1615 -> lighterment -> 20 fpm d; Sfermen only no measurment
	13:00	Bill Hicks	1.066	16.5	1 August
	14:00	Bill Hicks	1.066	16.5	- Despensiment
	15:00	Bill Hicks	1.066	16.5	- > 90 hom
	16:00	Bill Hicks	1.066	16.5	E 200 1
	17:00	Bill Hicks	1.066	16.5	disterment only
	18:00	D.L.	1.066	33.1	no measurmul
	18:40	D.L.	1.066	33.1	110 11110
				-	

C)	Calculate	actual	injection	depth at	t end o	f pumping.

Differential F	ressure	X	1	=	
		(S.G.	1 - S.G.2) X K		ft. TVD
490.988	X	1	=		
		(1218-1.06	6 x 4331)	7458TVD	

WATER-BRINE INTERFACE MECHANICAL INTEGRITY TEST PROCEDURE REPORT, PAGE THREE See Standard Operating Procedure (leb 121, dated 9/10/93)

5. Leak Check At End of Pumping:
 Time:
 Date:
 By:

 2000 Hrs
 6-30-04
 Darryl Lalonde-Bill Hicks

 Pressures:
 Test Well: 1054
 Reference Well: 1051

Leak Checks:

	Yes	No	Repaired
Wellhead Flanges		X	
Tubing Connections		Х	
Annulus Connections	X		Yes
Dilution Connections		X	
Blind Flanges		Х	
Bleed and Gauge Taps		X	
Other			

Comments:

After Two Hours

Time:

0100

7-1-04

Pressures:

Date:

1054 Test Well: 1039.71

Discharged bushing was leaking.

By:

Darryl Lalonde

1051 Reference Well: 549.616

Wait for 36 hours. Time Right Now:1600 MIT Start Time: 1600

Dur Dill Highs

7-10. Mechanical Integrity Test

	Date:		by:_biii Hicks		
		1054	1051		Change in
		Test	Reference	Differential	Diff, Press.
Date	Time	Well	Well	Pressure	Since Start
7-02-04	1600	1052.49	562.000	490.490	
7-02-04	1800	1052.74	562.334	490.406	.084
7-02-04	2000	1052.60	562.022	490.578	088
7-02-04	2200	1052.28	562.037	490.243	.247
7-03-04	0001	1052.78	562.186	490.594	104

11. Calculate Net Pressure Change (NPC)

NPC = <u>Diff. Press. (Start) - Diff. Press. (End)</u> Hours

NPC = (490.490-490.594) / 8 = -0.013psi/hr

NPC =WATER-BRINE INTERFACE MECHANICAL INTEGRITY TEST PROCEDURE REPORT, PAGE FOUR See Standard Operating Procedure (leb 121, dated 9/10/93)

12. Certification

This test was performed as per the procedure approved by the Environmental Protection Agency published in the Federal Register Vol 57, No. 7/Friday, January 10, 1992, Page 1109-1112. I certify that IMC Potash Well No. 1054 has

Ą.

X passed	failed
to demonstrate a net pressure change of les period.	s than 0.05 psi/hr over the eight hour test
Test conducted by:	
IMC Potash Hersey.	
Name: Bill Hicks	
Title: Minefield Supervisor	
Date: 7-03-04	
Signature: William Auds	
,	

Other individuals involved in test procedure:

Organization	Involvement
IMC	Operations
IMC	Operations
IMC	Operations
	IMC IMC



Mo. Potash sëy LLC 1395 135th Av :: Hersey, MI 49639 www.mosaicco.com

February 15, 2007

Lisa Perenchio, Chief Underground Injection Control Branch United States Environmental Protection Agency 77 W. Jackson Blvd, WU-16J Chicago, IL 60604-3590 RECEIVED

FEB 2 0 2007 UIC BRANCH EPA REGION 5

RE:

Permit MI-133-3G-A002

Well 1011 Plugging and Abandonment

Mosaic Potash Hersey intents to plug and abandon Class III solution mining Well Number 1011. This letter serves to notify the EPA of our intention.

The USEPA REGION 5 GUIDANCE #4 (revised December, 1994) will be followed to ensure proper plugging and abandonment of the well. GUIDANCE #4 along with the approved P & A plan contained in Part III(B) of Permit MI-133-3G-A002 will be used to establish the specific procedures.

Part (2) of mechanical integrity will be demonstrated with a temperature log prior to plugging the well. The temperature log will be used to demonstrate that there is no fluid movement behind the well casing.

Please inform me as soon as possible if this plan is acceptable or if other requirements need to be addressed. Additionally, let me know if the EPA wishes to witness any of the plugging operations so that I can coordinate the scheduling.

If I can assist you with any additional information, please contact me at 231-832-1216.

Sincerely,

Robert Schweitzer

Production Superintendent

Robert Schweitzer

Mosaic Potash Hersey

Cc: Raymond Vugrinovich, Michigan Department of Environmental Quality



Mos .ºotash sey LLC 1395 135th Av ..e Hersey, MI 49639 www.mosaicco.com

February 15, 2007

Lisa Perenchio, Chief Underground Injection Control Branch United States Environmental Protection Agency 77 W. Jackson Blvd, WU-16J Chicago, IL 60604-3590 RECEIVED

FEB 2 0 2007

UIC BRANCH EPA REGION 5

RE:

Permit MI-133-3G-A002

Well 1012 Plugging and Abandonment

Mosaic Potash Hersey intents to plug and abandon Class III solution mining Well Number 1012. This letter serves to notify the EPA of our intention.

The USEPA REGION 5 GUIDANCE #4 (revised December, 1994) will be followed to ensure proper plugging and abandonment of the well. GUIDANCE #4 along with the approved P & A plan contained in Part III(B) of Permit MI-133-3G-A002 will be used to establish the specific procedures.

Part (2) of mechanical integrity will be demonstrated with a temperature log prior to plugging the well. The temperature log will be used to demonstrate that there is no fluid movement behind the well casing.

Please inform me as soon as possible if this plan is acceptable or if other requirements need to be addressed. Additionally, let me know if the EPA wishes to witness any of the plugging operations so that I can coordinate the scheduling.

If I can assist you with any additional information, please contact me at 231-832-1216.

Sincerely,

Robert Schweitzer

Production Superintendent

Robert Schwirtzer

Mosaic Potash Hersey

Cc: Raymond Vugrinovich, Michigan Department of Environmental Quality



Mos rotast sey LLC 1395 135th Av ...e Hersey, MI 49639 www.mosaicco.com

February 15, 2007

Lisa Perenchio, Chief Underground Injection Control Branch United States Environmental Protection Agency 77 W. Jackson Blvd, WU-16J Chicago, IL 60604-3590 RECEIVED

FEB 2 0 2007 UIC BRANCH

EPA REGION 5

RE:

Permit MI-133-3G-A002

Well 1014 Plugging and Abandonment

Mosaic Potash Hersey intents to plug and abandon Class III solution mining Well Number 1014. This letter serves to notify the EPA of our intention.

The USEPA REGION 5 GUIDANCE #4 (revised December, 1994) will be followed to ensure proper plugging and abandonment of the well. GUIDANCE #4 along with the approved P & A plan contained in Part III(B) of Permit MI-133-3G-A002 will be used to establish the specific procedures.

Part (2) of mechanical integrity will be demonstrated with a temperature log prior to plugging the well. The temperature log will be used to demonstrate that there is no fluid movement behind the well casing.

Please inform me as soon as possible if this plan is acceptable or if other requirements need to be addressed. Additionally, let me know if the EPA wishes to witness any of the plugging operations so that I can coordinate the scheduling.

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Sincerely,

Robert Schweitzer

Production Superintendent

Robert Schweitzer

Mosaic Potash Hersey

Cc: Raymond Vugrinovich, Michigan Department of Environmental Quality



Mos. otash sey LLC 1395 135th Av. .e Hersey, MI 49639 www.mosaicco.com

February 15, 2007

Lisa Perenchio, Chief Underground Injection Control Branch United States Environmental Protection Agency 77 W. Jackson Blvd, WU-16J Chicago, IL 60604-3590 RECEIVED

FEB 2 0 2007

UIC BRANCH EPA REGION 5

RE:

Permit MI-133-3G-A002

Well 1042 Plugging and Abandonment

Mosaic Potash Hersey intents to plug and abandon Class III solution mining Well Number 1042. This letter serves to notify the EPA of our intention.

The USEPA REGION 5 GUIDANCE #4 (revised December, 1994) will be followed to ensure proper plugging and abandonment of the well. GUIDANCE #4 along with the approved P & A plan contained in Part III(B) of Permit MI-133-3G-A002 will be used to establish the specific procedures.

Part (2) of mechanical integrity will be demonstrated with a temperature log prior to plugging the well. The temperature log will be used to demonstrate that there is no fluid movement behind the well casing.

Please inform me as soon as possible if this plan is acceptable or if other requirements need to be addressed. Additionally, let me know if the EPA wishes to witness any of the plugging operations so that I can coordinate the scheduling.

If I can assist you with any additional information, please contact me at 231-832-1216.

Sincerely,

Robert Schweitzer

Production Superintendent

Robert Schweiter

Mosaic Potash Hersey

Cc: Raymond Vugrinovich, Michigan Department of Environmental Quality



Hallburton services

P.O. Box 374 Mt. Pleasant, MI 48804-0874 Office Number: (517) 772-6070 or 773-1080 Pax Number: (517) 772-9347

DATE: 11-22-91
DELIVER TO: Mr. Bob Schweitger Kalium Chemicals.
(616) 832 - 3349
PAGES TO FOLLOW: <u>5ea.</u> (Not Including Cover Sheet)
FROM: David andrews.
COMMENTS: Here is The Plug to Obsardon Liket for. the St. Hersey 2:35 well It was plugged from 5,486 to surface
from 5,486 To surface
Thenk you. David Order
If problems are encountered receiving any of the above listed documents, please call (517) 772-6070.



REMIT TO P.O. BOX 84707 DALLAS, TEXAS 75284 PAGE 1 OF

INVOICE

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362/73 AS PER ATTACHED & TICKET NO. TAX PEPERENCES FUR YOTAL A training a section for

WORK ORDER CONTRACT TREATMENT DATA FORM 1005 R-4 THE PERSON NAMED OF THE PE The second state of the second TO: HALLIBURTON SERVICES YOU ARE HEREBY REQUESTED TO FURNISH EQUIPMENT AND SERVICEMEN TO DELIVER AND OPERA areso WHAT ! THE SAME AS AN INDEPENDENT CONTRACTOR TO: AND DELIVER AND SELL PRODUCTS, SUPPLIES, AND MATERIALS FOR THE PURPOSE OF SERVICING. SEC ä Contraction of FIELD AGE AT ascerta STAYE_____ COUNTY_ OWNED BY_ The following information was furnished by the customer or his agent 1006.00 NEW AT. ALLEG WEIGHT HIE FROM 70 FORMATION NAME _____ Pall Bar 1000 PORMATION THICKNESS CASING عورس Miles W LINES PACKER: TYPE TUBING: 5496 TOTAL DEPTH. MUD WEIGHT AMETE/PT OPEN HOLE BORE HOLE ·.4. PERFORATIONS ٧, INITIAL PROD: RPD, HeD. . TPO. OAE PERPERATIONS . • EPO. HaQ. EPO, GAS PRESENT PROD: MOF 1 1 2 PERFORATIONS: п 7. 10. 11. PREVIOUS TREATMENT: DATE. TVER MATERIALS treatment instructions: Treat thru turing @ Annulus 🗆 casing 🖺 turing/annulus 🗀 hybraulic horsepower . . 14 4

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Market Control

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Coment PTA 9505K thursday

CUSTOMER ON HIS AGENT WARRANTS THE WELL IS IN PROPER CONDITION TO RECEIVE THE PRODUCTE, SUPPLIES, MATERIALS, AND SERVICES

THIS CONTRACT MUST BE SIGNED BEFORE WORK IS COMMENCED.

As consideration, the stone-numed Ocistamer agreed

- (a) To pay Hallburton in accord with the research forms stated in Hallburton's current price that, i
- (b) Halliburion shall not be responsible for and Customer shall secure Helliburion against any liability for derive to preparty of Quetomer and of the well owner (if different from Quetomer), unless demand by the willful meconduct organized negligance of Halliburion, this provision applying to but not similarly to subsurface demands and surface desirage arising from subsurface demands.
- (c) Customer shall be responsible for and secure Helicouron against any Heblity for reservoir loss or demage, or propany damage resulting from substurface pressure, losing control of the wall and/or a wall blowout, unless such loss or domage is caused by the willful mesonduot or eros negligence of Hebliburion.
- (d) Customer shall be responsible (or and secure Haliburton against any and all liability of whatenever nature for damages as a result of subsurface trespess. Or an action in the nature thereof, analing from a service operation performed by Haliburton hamsunder.
- (a) Commercially be responsible for any secure resistance and accurate resistance of causes and secure resistance and secure resistance of causes and secure resistance of causes and secure and causes are considered by the well, or any expectation of resistance and resistance
- (1) Halliburga makes no guarantee of the effectiveness of the effectives of meterials, not of the results of any treatment or service.
- (g) Customer shall at its dak and department to receive any Halliburton requirement, tools of instruments and received and instruments are not received and the west and the w
- (h) Because of the uncertainty of variable well conditions and the necessity of railying an facts and supporting services turnished by officers, Haliburton is unable to guarantee the encuracy of any other state presents, respect to any properties and the sent purposes of the later of the last officers of the last of the la
- II) Helicuries warrants only title to the products, supplies and materials and that the same are tree from detects in warrantship and materials. THERE ARE NO WARRANTIES, EXPRESS OR SUPPLIED, OF MERCHANTIABILITY, FITNESS OR OTHERWISE WHICH EXTEND BEYOND THOSE STATED IN THE IMMEDIATELY PRECIDING SENTENCE. Helicurion's liquility and Customer's exclusive famous in several washing in appear whicher it wenters, to the same of any products, supplies or materials in appearing himlind to the replacement of such products, supplies or materials on their return to realistance of, at Helicurion's option, to the ablovence to the Customer of credit for materials in the event shall helicurion as its far for countries of consequents demanded.
- (i) Incomes develop with a wind the following month entracts of invoice. Upon Customer's delault in payment of Customer's account by the last day of the month following the month to which the invoice is delact. Customer agreed to pay interest increan after default at the highest tawful pontract file abolicate but haver to exceed take per entury. In the event it becomes indeed any to employ an afterment of account, of the delaction of the unput - IN THE COURSE SHEET OF GOVERNOR BY THE WAY OF THE SEED WHO'S SOURCES OF PERFORMENT OF SQUIDMENT OF HEISTIES AND FURNISHED.
- (i) Hallimenton shall not be bound by any changes or modifications in this contrast, example where such changes or modification is made in writing by a duty suthorized executive officer of Halliburbos.

I HAVE READ AND UNDERSTAND THIS CONTRACT AND REPRESENT THAT I AM AUTHORIZED TO SIGN THREADS AS EVETOWERS ABOUT

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BATE - 8/29/74

We certify that the fair labor limited and of 1932, or amonately, has been compiled with in the production of goods and/or with respect to revices furnished under this contract.

TIME 0830 CM RM

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500-207		111	BERVICE CHARGE				ου	1020	2	195	973	25
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STATE OF MICHIGAN IT OF NATURAL RESOURCES DEPAR LOG OF OIL, GAS, POSAL OR STORAGE WELL (ACT 61) Submit in DUPLICATE Within 30 Days after Well Completion

1	PERMIT NUMBER
Ī	36033
Ì	DEEPENING PERMIT NUMBER

NAME(S) & A	DDRES	F OWNER		NAME & AODRESS OF DRILLING CONTRACTOR(S)										,				
PPG Oil	1 & G	as	Co., I	nc.			T. D. Provins Drilling											
2258 E	nterp	ri	se Driv	e		1			terpri									
Mt. Ple	asan	t,	MI 488	58			Mt.	<u>P1e</u>	easant,	MI	488	358						
LEASE NAME			LNUMBER	SHOWN OF	PERMIT		DIRECTIONALLY DRILLED											
Grein i							YES NO VX											
SURFACE LO		N		SECTION		TOWNSHI	P	ŀ	PANGE			TOWNSHIP NAME						
SE NW 1					36	17N		\perp		9W		_1	Hers					
FOOTAGES	-		th/South)		0051		est/West)							NAME				
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SUBSURFAC	E LUCA		, INI	SECTION		IOWNSHII		'	RANGE			lion	NSHI	PNAM	E	:		
FOOTAGES	·	Nor	th/South)	<u> </u>	·	<u> </u>	est/West)					100	NTV	VAME				
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DRILLING					EPTH OF WE		TYPE WE					┪						
7-	-188				_وما							1		LEVA	TION	<		
DRILLING			ED .	1	ION AT T.D.		FY. DRLD	. –	ROTARY	TOO	Ls	K.B.			A.F.			
	L 2- 83			Cab	ot Head	From	0	ть_8	119				.27	11:	26			
WELL CO	MPLET	ΕD		PRODUCI	NG FORMAT	ION(S)	FT. DALD	. —	CABLE TO	OLS		R.T.		-	Grd.			
- 1	-22-8	23					From		To						11:	10		
				.1			<u> </u>					<u>_i_</u>			<u></u>			
	ASING	, CA	SING LINE	ERS AND C	EMENTING					P	ERFO	RATIO	NS.					
SIZE	Wi	4ER	E SET	CEM	ENT	Ft. Pulled			NUMBER							DPI	N	
20"	1	04	1	DP			DATE		HOLES		NIEF	IVALP	EHFO	HATE		YES	NO	
11 3/4	9	04	1	350 poz/200 C1		A	11-19-	83	26x		803	0-46	1x	/ft		XX		
8 5/8	54	18	' Sch	1210 s	x 1t-300	sx Cl A	<u> 4 </u>				804	9-59	1x	/ft		XX		
5 1/2	<u>81</u>	18		425 sx poz-300 lt					<u> </u>									
				160	C1 A	<u> </u>	<u> </u>	!	<u> </u>	<u> </u>							<u> </u>	
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						<u> </u>	ALLUINE	. n u	 -	A3 2	HUN							
FORMAT		- 0	IL OR GAS		TO	FORM	ATION	ا	OIL R GAS	DEI	PTH	Sam-		E OBS	ERVE Mud Line	D (X)	Fill	
Burnt B	LULI	╅	Gas	8130	8170					2600		pies	777	1	Line	Log.	Up	
	·	╫		 		Sumbur Antrin		_	as	31		-		_		X	-	
		+				Sour 2			as	46		+	 			X		
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:	JUMITE	AT	DN BY AC	ID OR FRA	CTURING		WAT	ER	FILL UP (F.U.1	OR L	.ost C	RCUL	ATIO	N (L.C	ix) (xi		
DATE	Inter	val 7	Frested	Materia	is and amoun	t used	FORM	TAN	ION	F.U.	L.C.	DEP	тн		AMO	UNT		
1-20-83	80	30	-59	500 g	21. 28%	HC1	None											
1				·			<u> </u>											
	AECH A 1	NIC	A) LOGS I	IST FACH	TYPE RUN		DEPTH C	o R R	ECTION	DE	/1 A Tt	∩N !!</td <td>RVEY</td> <td>Pt I</td> <td>JGGEI</td> <td>D RAC</td> <td>ĸ</td>	RVEY	Pt I	JGGEI	D RAC	ĸ	
								 -						·				
Brand		(X)		TYPES	LOGGED IN		DEPTH	1cc	PRECTN	π .	N AT	1	REES	YES	NO	OE	TH	
Schlumbarger		X	LDT-C Sonic		200-81			+-		46		$\frac{1}{1}$		 	╃—	 		
					<u> </u>	╅╴		58		_1	40	<u> </u>	+	+				
			Duar-		2,00-0.			1			00	116		1	+-	+		
11							<u> </u>					<u></u>		<u>tt</u>				
					PA	ODUCTION	TEST DAT	ΓA										
OIL - Bbis/d	ey GF	VAF	ITY - "AF	COND.		AS - MCF/d	BY WATE	R —	Bbls/day	125 -	Grain	12/100	cu. ft.	B.H.I	P. ANI) DEP	тн	
	- -					1,400												
													-					
AM RESPON	SIBLE	FOF	THIS REI	PORT. THE	INFORMATI	ON IS COM	PLETE AN	D C	ORRECT.		<i>t</i>							
PATE 9/	L3/83	,	YANE AND	TITLE (PF	IINTI Doker	B-59		Sŧ	GNATUR	<u> </u>		2		13,	اربرء	[_		
773	,	- 1				<u></u>		ı	I //	1,000	_	•	— •		-			

NOTICE REPORT COMPLETE SAMPLE AND FORMATION RECORD AND DRILL STEM TEST INFORMATION ON REVERSE SIDE

R - 7210 Rev. 3/77

STATE OF MICHIGAN DEP/ ENT OF NATURAL RESOURCES

LOG OF OIL, GAS, ... SPOSAL OR STORAGE WELL (ACT 61) Submit in DUPLICATE Within 30 Days after Well Completion

PERMIT NUMBER 36925 DEEPENING PERMIT NUMBER

11 14 E E P. E																	
NAMEISIG	DDRESS O	F OWNER	S) SHOWN C	NPERMIT		NAME & ADDRESS OF DRILLING CONTRACTOR(S)											
	1 & Gas). Prov					,,,,					
	nterpri						3 Enter		e Dri	ve							
	easant,				ļ		Pleasa										
LEASE NAMI				PERMIT	1						ECTIO	I I A SA	YORI	LLED			
	o #1-36																
SURFACE LO			SECTION		TOWNSHI	<u> </u>	BANGE			YES NO XX							
NE NW				36	171			9W									
FOOTAGES		th/South)				st/West)	,	Э П		Hersey COUNTY NAME							
	t. from N		Line and	840	_Ft. from	•	ine of quar					sce					
SUBSURFAC			SECTION		TOWNSHI		RANGE		<u> </u>	TON	VNSHII						
			Į														
FOOTAGES	(Nor	th/South)	<u> </u>		(E	est/West)	<u> </u>			COU	NTY	NAME		<u> </u>			
F	t. from		Line and	*	Ft. from_		ine of qua	rter sect	ion								
DRILLING				EPTH OF WE		TYPE WEL											
_ 8-1	7-83			200 Log_		Gas	Well			1	E	IFVA	TIONS				
DALLING	COMPLET	ED		ON AT T.D.		FT. DALD	ATOR -	AY TOC	OLS	K.8.			R.F.				
9-1	0-83		Cabo	ot Head		From(To	8190		1	183.		i	81.	9		
WELL CO	MPLETED		1	NG FORMAT	ION(S)					R.T.			Gra.				
	-17-83		1	nt Bluff		From				1			1	166.	6		
		······································								<u> </u>			<u> </u>				
•	CASING, CA	ASING LIN	ERS AND CE	MENTING				ı	PERFO	RATIC	ONS						
SIZE	WHER	ESET	СЕМ	ENT	Ft. Pulled		NUME	FR					I	QP1	ΕN		
24"	4" 100		מ	.Р.		DATE	HOL		INTER	VALP	PERFO	HATE	o t	YES	NO		
11 3/4"		4 Sch	T	50 sx		11-16-	83 lx/	Et	80	086-8	8089			X			
				70 sx			lx/	Ēŧ	80	94-8	8102			Х			
	8 5/8" 5476 Sch		950 sx			lx/ft			0.1	000	0110				i		
5 1/2"	819	0	1 9'	50 sx		l	1x/:	ובן	8.	L08-8	OTTZ		٠,١	X			
5 1/2"	819	0	9.	50 sx			1x/	[[8.	LU8-1	0112			Х.			
5 1/2"	819	0	9.	50 sx			1x/		8.	LU8-1	0112			X			
5 1/2"	·	PAY INTE		50_sx		ALL OTHE						OR L	OGGE	-			
5 1/2"	GROSS		RVALS	50 sx				D GAS	SHOWS	OBSE	RVED		OGGE)) (x)			
FORMA	GROSS	PAY INTE	RVALS			ALL OTHE	R OIL AN	D GAS		OBSE	RVED			· >	Fitt Up		
FORMA	GROSS	PAY INTE	RVALS			ATION	R OIL AN	D GAS	SHOWS	OBSE Sam-	RVED WHER	E OBS	ERVE Mud	D (X)	Fill Up		
FORMA	GROSS	PAY INTE	RVALS		FORM	ATION ie	ROIL AN	D GAS:	SHOWS	OBSE Sam-	RVED WHER	E OBS	ERVE Mud	D (X) Gas	Fits		
FORMA	GROSS	PAY INTE	RVALS		FORM Travers	ATION Se Lty Dol	ROIL AN OIL OR GAS Gas	D GAS:	SHOWS EPTH	OBSE Sam-	RVED WHER	E OBS	ERVE Mud	O(X) Gas Log	Fits Up		
FORMA Burnt Bl	GROSS TIDN C uff	PAY INTE	RVALS S FROM 8090	то 8126	FORM Travers Reed C:	ATION Se Lty Dol	OIL AN OIL OR GAS Gas Gas Gas	DE GAS:	SHOWS EPTH 620 065 810	OBSE Sam- ples	RVED WHER Odor	E O 8S	ERVE Mud Line	Gas Cog. XX XX	Fits Up		
FORMA Burnt Bl	GROSS TIDN C uff	PAY INTE	RVALS	то 8126	FORM Travers Reed C:	ATION Se Lty Dol	ROIL AN OIL OR GAS Gas Gas	DI GAS:	SHOWS EPTH 620 065 810	OBSE Sam- ples	RVED WHER Odor	E O 8S	ERVE Mud Line	Gas Cog. XX XX	Fits Up		
FORMA' Burnt Bl	GROSS TIDN Q Uff STIMULAT	PAY INTE	RVALS S FROM 8090 CID DR FRA	TO 8126 CTURING	FORM Travers Reed C: Richfie	ATION Se Lty Dol Eld WAT	OIL AN OIL OR GAS Gas Gas Gas	DI GAS:	SHOWS 620 065 810	OBSE Sam- ples	RVED WHER Odor	E O 8S	ERVE Mud Line	O (X) Gas Log. XX XX XX	Fits		
FORMA' Burnt Bl	GROSS TIDN Q Uff STIMULAT	PAY INTE	RVALS S FROM 8090 CID DR FRA	TO 8126 CTURING	FORM Travers Reed C: Richfie	ATION Se Lty Dol Eld WAT	ROIL AN OIL OR GAS GAS GAS ER FILL	D GAS: Di 3() 4() 48	SHOWS 620 065 810	OBSE Samples	RVED WHER Odor	E O 8S	ERVE: Mud Line	O (X) Gas Log. XX XX XX	Fits		
FORMA' Burnt Bl	GROSS TIDN Q Uff STIMULAT	PAY INTE	RVALS S FROM 8090 CID DR FRA	TO 8126 CTURING	FORM Travers Reed C: Richfie	ATION Se Lty Dol Eld WAT	OIL AN OIL OR GAS GAS GAS GAS GAS	D GAS: Di 3() 4() 48	SHOWS 620 065 810	OBSE Samples	RVED WHER Odor	E O 8S	ERVE: Mud Line	O (X) Gas Log. XX XX XX	Fits Up		
FORMA Burnt Bl	GROSS TIDN Q Uff STIMULAT	PAY INTE	RVALS S FROM 8090 CID DR FRA	TO 8126 CTURING	FORM Travers Reed C: Richfie	ATION SE LTY Dol eld WAT FORM	OIL AN OIL OR GAS GAS GAS GAS GAS	D GAS: Di 3() 4() 4() 4() UP (F.U)	SHOWS 620 065 810	OBSE Samples	RVED WHER Odor	E O 8S	ERVE: Mud Line	O (X) Gas Log. XX XX XX	Fitti Up		
FORMA' Burnt Bl	GROSS TIDN Q Uff STIMULAT	PAY INTE	RVALS S FROM 8090 CID DR FRA	TO 8126 CTURING	FORM Travers Reed C: Richfie	ATION SE LTY Dol eld WAT FORM	OIL AN OIL OR GAS GAS GAS GAS GAS	D GAS: Di 3() 4() 4() 4() UP (F.U)	SHOWS 620 065 810	OBSE Samples	RVED WHER Odor	E O 8S	ERVE: Mud Line	O (X) Gas Log. XX XX XX	Fits		
FORMA' Burnt Bl	GROSS TIDN Q Uff STIMULAT	PAY INTE	RVALS S FROM 8090 CID DR FRA	TO 8126 CTURING	FORM Travers Reed C: Richfie	ATION SE LTY Dol eld WAT FORM	OIL AN OIL OR GAS GAS GAS GAS GAS	D GAS: Di 3() 4() 4() 4() UP (F.U)	SHOWS 620 065 810	OBSE Samples	RVED WHER Odor	E O 8S	ERVE: Mud Line	O (X) Gas Log. XX XX XX	Fits Up		
FORMA' Burnt B1	GROSS TIDN C Uff STIMULAT Interval 8086-	CON BY ACTIVE STATE OF THE STAT	RVALS S FROM 8090 CID DR FRA Materia 2000	TO 8126 CTURING Is and amoun gal. 20%	FORM Travers Reed C: Richfie	ATION SE Lty Dol eld WAT FORM	ROIL AN OIL OR GAS GAS GAS GAS ER FILL	3(4(4) DP (F.U	SHOWS 620 065 810 J OR L	OBSE Samples OST C	RVED WHER Oder	Pits ATIO	ERVE Mud Line	D (X) Gas Log. XX XX XX XX XX XX XX XX XX			
FORMA' Burnt B1	GROSS TIDN C Uff STIMULAT Interval 8086-	CON BY ACTIVE STATE OF THE STAT	RVALS S FROM 8090 CID DR FRA	TO 8126 CTURING Is and amoun gal. 20%	FORM Travers Reed C: Richfie	ATION SE LTY Dol eld WAT FORM	ROIL AN OIL OR GAS GAS GAS GAS ER FILL	3(4(4) DP (F.U	SHOWS 620 065 810 J OR L	OBSE Samples OST C	RVED WHER Oder	Pits ATIO	ERVE: Mud Line	D (X) Gas Log. XX XX XX XX XX XX XX XX XX			
FORMA' Burnt B1	GROSS TIDN C Uff STIMULAT Interval 8086-	GAS	RVALS S FROM 8090 CID DR FRA Materia 2000 LIST EACH TYPES	TO 8126 CTURING Is and amoun gal. 20%	FORM Travers Reed C: Richfie	ATION SE Lty Dol eld WAT FORM	ROIL AN OIL OR GAS GAS GAS GAS ER FILL	DE GAS: DE	SHOWS EPTH 620 065 B10 J OR L L.C.	OBSE Samples OST C DEP	RVED WHER Odor IRCUL TH RVEY	PL	Mud Line N (L.C AMO)	D (X) Gas Log XX XX XX XX XX D (X)			
FORMABURIT B1	GROSS TIDN C Uff STIMULAT Interval 8086-	GAS	RVALS S FROM 8090 CID DR FRA Materia 2000 LIST EACH TYPES	TO 8126 CTURING Is and amount gal. 20% TYPE RUN LOGGED IN 200-8	FORM Travers Reed C: Richfie	ATION SE LTY DOI 1d WAT FORM NODE	ROIL AN OIL OR GAS GAS GAS GAS ER FILL	D GAS: DE 3(4(4(4(5(10(10(10(10(10(10(10(10(10(10(10(10(10(10(10(10(10(10(10(10(10(10(10(10(10(10(10(10(10(10(10(10(SHOWS 620 065 810 JORL L.C. VIATIO	OBSE Samples OST C DEP ON SU OEG	RVED WHER Odor IRCUL TH RVEY	PL	Mud Line N (L.C AMO)	D (X) Gas Log XX XX XX XX XX D (X)	K		
FORMA Burnt B1 DATE 11-17-83 Brand Schlumberger Birdwell	GROSS TIDN C Uff STIMULAT Interval 8086-	GAS	RVALS S FROM 8090 CID DR FRA Materia 2000 LIST EACH TYPES	TD 8126 CTURING Is and amount gal. 207 TYPE RUN LOGGED IN 200-8	Travers Reed C: Richfie	ATION SE LTY DOI 1d WAT FORM NODE	ROIL AN OIL OR GAS GAS GAS GAS ER FILL	D GAS: Di	SHOWS 620 065 810 J OR L LC. VIATIO	OBSE Samples OST C DEP ON SU OEG	RVED WHER Odor IRCUL TH RVEY GREES L/2°	PL	Mud Line N (L.C AMO)	D (X) Gas Log XX XX XX XX XX D (X)	K		
FORMA' Burnt B1 DATE 1-17-83 Brand Schlumberger	GROSS TIDN C Uff STIMULAT Interval 8086-	GAS GAS GON BY ACTIVE STEEL	RVALS S FROM 8090 CID DR FRA Materia 2000 LIST EACH TYPES IL GR	TO 8126 CTURING Is and amount gal. 20% TYPE RUN LOGGED IN 200-8	Travers Reed C: Richfie	ATION SE LTY DOI 1d WAT FORM NODE	ROIL AN OIL OR GAS GAS GAS GAS ER FILL	D GAS: Di	SHOWS 620 065 810 JORL L.C. VIATIO	OBSE Samples OST C DEP ON SU OEG	RVED WHER Odor IRCUL TH RVEY	PL	Mud Line N (L.C AMO)	D (X) Gas Log XX XX XX XX XX D (X)	K		

I AM RESPONSIBLE FOR THIS REPORT. THE INFORMATION IS COMPLETE AND CORRECT.

CDND. Bbis/day

OIL - Bbis/day GRAVITY - *API

B-62 SIGNATURE NAME AND TITLE (PRINT) 11-9-83 William E. Booker, Geologist

GAS - MCF/day

1,450

WATER - Bbls/day H2S - Grains/100 cu. ft.

STA F STARGAN DEPARTMENT LANGUAGE LOG OF OIL, GAS, DISPOSAL OR STORAGE WELL (ACT 61) Submit to Dispusation

- [ANUMBER _
1	38748
	DEEPENING PERMIT NUMBER

•	1 U & #	ō Mil	N DON'ICA	KIE WRING SI	veli Completi	i)	-										
NAME(S) & A				S) SHOWN O	NPERMIT	I .	NAME & ADDRESS OF DRILLING CONTRACTOR(S)										
PPG OIL						•	INDRIL,										
2258 Ent				_			PO Box										
Mt. Plea							Mt. Ple	asant, M	I 4885	_	•						
GREIN #1		VELI	LNUMBER	SHOWN ON	PERMIT					DIR YES	ECTIO	NALL NO		LLED			
SURFACE LO	CATIO	N		SECTION		TOWNSHIP	•	HANGE		TOWNSHIP NAME							
NE'z SE'z	NE¹z			35		17N		9W		He	raey						
FOOTAGES		_	th/Southi		/40		ist/West)	_			NTY'N Ceola						
833 F			JUEN (ine and	400	_Ft. irom		ne of quarter	tection	_	NEMIP		2				
, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	<u></u>	-,,,	/1 -	32011016						"	119100		•				
FOOTAGES	(Nor	th/South)	1		(E	st/West)	<u> </u>		COU	NTYN	AME					
F	t. from				,n		اليسسا	ine of quarter	section								
DRILLING		N			PTH OF WE		TYPE WEL	L				·					
06/05/					06Lon_8	2T A \	Gas				************	LEVA		8			
06/25/		LET	ED	1	ON AT T.D.			ROTARY	·	K.B.	15.4		A.F.	4.2			
T WELL CO		FR.		1	. REEG	101161		- CABLE T		R.T.			Sed.	4.6			
07/29/		E LJ			Bluff	100(2)	· 	To	oous .	R.T.			119	9			
		. CA	SING I INI	ERS AND CE					PERFO	L BATIO	Nŝ						
							1			-	-						
51ZE		64	E SET	CEM	ENT	Ft. Pulled	DATE	NUMBER	INTER	VALF	ERFO	RATE	□	OF6 Yes	NO		
11-3/4" 939'		130 141	e. 200 (1.1 A	7/27/	A5 10	2006-05	. 8104-07		7 6	110		70				
11-3/4" 939' 130 Lite, 20 8-5/8" 5508' 1st stage 45						4/ft	0020-30	<u>. 01</u>	<u> </u>	<u> </u>	<u> 1101</u>	<u>-61</u>					
77				rge 650 I		D CLA								_			
5-1/2"	82	04	,	365 PO2	, 175 Ci	Α											
		000	PAY INTE	BVALC			ALL CTUE	R OIL AND O	3 A C OLLOWO		AVES				_		
FORMA							A ING		370 010M8				**********				
Burnt B1		+	Gas	8045	81.22	FORM	ATION	OIL Of gas	CEPTH	Sam. Piet	Quo:	F#3	Mud Line	Gae Log.	F.EI Up		
During and		十				Antrim		Gas	3150	1			LANE	X	-		
						Reed Ci	ty Dolo	11	4150	1				X	<u> </u>		
						Sour Zo		17	4650					X			
	CT (88)	LAT	ION OV AC	CID OR FRA	CTUBING				/5.44.1. D.D. 1.			4					
								ER FILL UP				ATIO					
7/27/85			17 ested		is and amount		NON		F.U. L.C.	DEP	1 194		AMO	UNI	_		
7/28/85					20% Feb		- non	<u>.c</u>		·····							
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			7141	JUU BELL								· · · · · · · · · · · · · · · · · · ·					
				·····						•							
										-							
	MECHA	NIC	AL LOGS,	LIST EACH	TYPE RUN		DEPTH CC	RRECTION	DEVIATIO	w su	RVEY	PLI	JGGE	D BAC	:K		
Brand		(x)	LOG	TYPES	LOGGED IN	TERVALS	CEPTH	CORRECTN	RUNAT	DEG	REES	YES	NO	DEF	HI		
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NAME AND TITLE (PRINT)
William E. Booker, Geologist

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STATE OF BROHGAR DEPARTMENT OF NATURAL RESOURCES SECULOGICAL BURYEY DIVISION

MAT 13 1976

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WELL PLUGGING RECORD

(Submit in TRIPLICATE William 30 Days After Plugging is Completed)

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´J. O. Metch 130 Bast Jefferson Sterling, Richigan 40459 1

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April 9, 1982

Michigan Department of Matural Resources Oil and Cas Division Stevens ? Mason Bldg.

Attm: Milt Core

Dear Mr. Gere.

P. P. ZO, 888

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In response to your recent request for a driller's log from the Randolph #1 in Hersey Tep. of Oscessla County, please be informed that this wall was drilled and plugged by a company known as Jahoor. At my request your agency transferred the permit to me. Apparently this was done without ever having received the required log from Jeboor. I did not receive a log from the original operator and have no knowledge of one having been prepared. Since the hole was originally drilled approximately twenty years ago, I have no way to obtain the requested information.

Sincerely,

J. C. mutch

J. O. Match

P.S. I have just talked with my sec, Harry Match and he tells me that you gave him permission to deepen this well ten feet and in doing se, encountered more water so he plugged it and sent you proper papers and shortly after you requested the same papers he had sent in so he did it the second time.

B-37

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BYATE OF MICHIGAN DEPARTMENT OF RATURAL RESOUR GEOLOGICAL SURVEY DIVISION JUN 1 4 1878

WELL PLUGGING RECORD

TRIPLICATE WIRTHIN 30 Days After Phogeng a Co

28888 FIELD NAME

						Hersey ga	16
J.O. Kutch Ste			-	**************************************		- <u>*</u>	
Randolph, P		Unit #	1				WELL NUMBER
WELL LOCATION APPROXIX C NY X	¥ SEC.	35 T.	17	'N R	9#	Township Hersey	COUNTY
TYPE OF WELL TOH, GAL DIV HOW dry hole	9, 64 C.)			160		FORMATION	
6-6-79 OATE PLUGGING STARTED DATE PLUGGING COMPLETED D				DEPT. HE	PRESENTA	chael J. Kos	PERMIT OR WITHESSED

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Were tools, tubing, casing, etc., lost or left

BRIDGES DR PLUGS								
TYPE (Brush, \$tone, Coment, Mechanical, etc.)	DEPTH PLACED	BACKS OF CEMENT AND ADDITIVES						

If yes, give details:

in the hole before or during plugging?	YES	[X]NO	
Did a Service Company pump mud, spot cement, or set bridge plugs?	Z YES	□ NO	If yes, give name and address: Allied Services Mt. Pleasant
Was the well plugged by a Company or Courtractor other than Owner or Operator?	YES	□ MO	If yes, give name and address: Allied Services Mt. Pleasant
Representatives of Owner, Operator, Company, opingsing:	Contractor	who witnessed	Harry L. Mutch-Larry Sibley
We nulled easing to 750 ft	and ce	mented w	sacks of cement on bottom with a it. and rumped mud in hole.
of cement to surface, de with cement. We cut casing			filled to the surface of pipe and and welded plate on top.

CERTIFICATION

"I state that I am authorized by said Owner or Operator to make this report; and that this report was prepared under my supervision and direc tion, and that the facts stated herein are true, correct and complete to the best of my knowledge."

NAME AND TITLE (Typed or Printed)

Harry L. Mutch

DIVISION

SURVEY

といいろ SLAVEY

DIVISION

SLRVEY SLRVEY SLRVEY

DATE (Month, Day, Year)

6-11-79

COMPANY NAME AND ADDRESS

J.O. Mutch

Sterling, mich. 48659

IUSE REVERSE SIDE IF NEEDED!

R 7213 Rev 476

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DEPARTMENT OF HATURAL BUILDINGS

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Ξi	SIGNATURE		or Authorited R				DATE	······································
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: (Ā)	NOTE, W	ELL ROYDA	(AECOMO FON	m R 7212, is to be filled		n 30 dayilletter completion		A /237 3/73
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333	5 <i>0</i>					HE REVERTIBLE	иси ст, года ст. т. т. т. НСМ: 5- 1172 8 г. т. М.	SICAN
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REMORE OR DEFFERM

PERWIT NURSEER	DEEPENHO PERMIT NUMBER	FIELD HAME	- 2
26498	DP#1779	Proctor Greek	
	Pred A		
ANALY L. HAVE	<pre><pre><pre>< Do Texaguire Ed E</pre></pre></pre>	attle Creek, Kich 40	015
LEASE OR FARM MAME	att the		WELL MUNICER
Donald Grein			> */
MELL LOCATION	section .	TOWNSHIP	COUNTY
Center of RWi		7-N R. 9-W Hersey	0.50801.8
WELL COMPLETED FOR 104, Gas	Gas Storege, Brive Capous, Wester	TOTAL DEPTH AFTER REWORK	MECHANICAL LOGS RUR
Injection stell		1539	<u> </u>
WELL COMPLETED IN (Marie Rock	Formation eret Zone of Completioni	DATE REWORK COMMENCED	DATE REWORK COMPLETED
Stray Sand	·	May 6. 1975	May 7 1075
NAME AND ADDRESS OF CONTRA	ACTOR		
Levis Sibley Wal	kerville, Wichigan		

C#	PF92	Cem	equi .	Perforetions		Acid or Frecture	Perforations
Sire	Depels	Sacks	Туре	From	To	Treatment Report	if plugged, hear?
8 5/8	"= 664T	50		none			
							- 14
2 H	1500	35		none		none	
			_				

Com	<u> </u>	Cernent		Perfort tons		From Yo		Acad or Fracture	Perforstions
Size	Depth	Secks	Type	Trestment Record	If plugged, house				
5/8"	6641	50							
* 11	15001	35		none		none	none		

DESCRIBE REWORK OPERATIONS IN DETAIL

We deepened the well from 1527 ft. to 1539 ft.

IMPORTANT! SEE REVERSE SIDE

STANCE EIVISION - BOX SOUZE - LANSING AN AREA DIVISION - BOX SOUZE - LANSING AN AREA DIVISION - BOX SOUZE - LANSING AND AREA OF CARREST AND AREA O

STATE OF WICHIGAN JAN 10 3772 PARTMENT OG OF OIL. GAS OR TEST WELL 3-30-72 FFRES WITH SUPERVISOR OF WELLS WITHIN 30 DAYS AFTER COMPLETION OF WELL 1867 61 P & 1620 \$710. AND ACT 800 P & 16271 28710 Ī 12. Best LLCC, Reed City, Wiche 19-77 **P B** Thompson-Randelph 1176 世 4 (OIL BAS. BEING BISPOSM, DOV HOLE) Dec. 13, 1971 completed., Dec. 27, 1971 completed. Drilling contractor. Sibler & Reed City, Mich. Operator DEVIATION SERVEY WATER ZONES BIL OR GAS ZONES DEGER Asous T STEEL LINES RISE CORRECTED TO \$122 30 710 200 sx 55 == 1550 불물불 CALSTAG. ACID OR SHOOTING RECORD PERFORATIONS CIS ALTON L 0 feet te... 1550 feet. Cable tools from 1550 ... feet te... 1586 feet. 4, 4 8 well, co ft. per 26 hours Wet yet tested The above information is complete and carrect. hologist Jan. 7, 1972 GIVE COMPLETE FORMATION RECORD ON REVERSE SIDE B - 50THE THE PROPERTY OF THE PARTY O

BEEN DIVISION - HEN XXXX - LUNG HE ABOUT

DEPARTMENT OF NATURAL RESOURCES

Determine person number

Distributes

Date issues

5-5-25

APPLICATION

TO

	^	LIABLATE	1 1 4 4 4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	A T1	er e			
である。ならはは日本	CHANGE WELL STATUS						PIELD HAME	
28710	(SUBMIT IN QUADRUPLICATE)						Proctor 6	reek #22
HAME AND ADDRESS OF WELL O	CARVE PI							
I.O. Butoh Stor	ing Wichigan	4865	9					
LEASE OR FARM HAME							METT MONSE	A __
Thempson - Rando	l pa						1	
WELL LOCATION	SECTION					TOWNEHIP	C	DUNTY
Center of Swa	36	т.	17-N	角.	9-7	Hersey	0 8 0 4	eola
	(Deopen, Plug Back, Conver	nt to inject	ion or Dissource	W41,	Terresor	BYRY ADARGEN ES	aj	
APPROVAL REQUESTED TO	Deepen 100 fee	tor						
DATE DRILLING COMPLETED	DATE LAST PRODUCE	O .	LAST PR	000	CTION	(Amvey)		
12-27-71_	Shut-in		zone		OIL.		WTR.,	M C.F. GAS
WORK TO BE DONE BY							WILLSTART	DATE
*							٠	* * *

CASING AND CEMENTING RECORD

BIZE DEFTH NO SACIS CEMENT PERFORATIONS

8 5/8# 710* 200 DOTA

5 # 1550 55 NOTA

DESCRIBE PROPOSED WORK IN DETAIL:

FORMATION RECORD

(Formation and depth, DH, Gas & Witt. shows, stal)

Drift - 700°
Bayport -1200°
Michigan -1240°
Triple Gypsum 1390°
Brown Lime 1469°
Stray Sand 1585° T.D. 1584°

We plan to deepen this well approximately ten feet. However we may want to deepen into the Marshall formation. We do not plan on adding any pasing to this well.

(TO DEEPEM 100 PT. OR LESS, FROM PTD 1586' TO NTD. 1686' FOR INCREASED GAS PRODUCTION)

The proposed were as outlined above and approved by the fuguervisor or his Author (ad Representative) with the provisions of Act 61, P.A. 1939 and or Act 226, P.A. 1837 and the rules and requisitions issued	will be executed in accordance and adopted thereunder
SIGNATUHE (Well Owner of Authorized Realizatives)	march 31, 1975
Aringheosy James James	May 5 1975
NOTE: WELL REWORK A CORD FORM A 7212 IS TO be filled in This man a within 300	R 1231 9/73

SECONO DIVISION - BIX XXXX - UNCIDE, ME SECONO DIVISION - BIX XXX - UNCIDE, ME SECONO

\$280 500

Z:

ICAL SURVEY DIVISION - BOX 30738 - LANSING

TANGING, MI 48909

DIVISION - BOX BOOZE - LINEIL

TIES OI VON 36, 16 A

1 1

DIVISION

FILE IN CLIPLICATE WITHIN 20 DAYS AFTER COMPLETION OF REWORK OR DESPENING

						4	va d
PERMIT NUM		D		HANT NUMBER	FIELD N		e Maria
29710			DF# 178	30	Pro	ctor Creek	그 시 글 중시 나를
	ACCRESS OF						
LEASE OR F	y L. Mut	CU < 20	Lakesh:	ire ka, b	SERTS C	reek, Mich. 490.	· · · · · · · · · · · · · · · · · · ·
			John S ee :				· BEELL MUNISE!
WELL LOCAT	<u> </u>	<u>undolp</u>	2	4. A.I			
				TION		TOVERSUIT	COLARIY
Center	PI SIF			56 V. Dispossi, Water	17-N	W. 9-W Herse	7 Osceola "
Injection (T SO FOR RO	M, GE, GE	E-100000 St.mo	Cispossi, Water		DEPTH AFTER REWORK	MECHANICAL LOGS (UN
well comme	GAS			4 4	10	CO ft.	20.00
			No. 20 112 4 1 1	one of Complettic		EWORK COMMENCED	DATE NEWDAK COMPLETED
NAME AND	Contes of	- AL PER R. P. P.		· · · · · · · · · · · · · · · · · · ·	1 114	178,1975	WBY 9, 1975
			1 75 4 4 -			-	3 kg 1 % 1 % 1
<u>1.4</u> W 1 2	T21 OTEX	Ball		e, Kichie	311		
			WEI	I CARING DE	CORD R	FORE REWORK	
Cast				Perforat			· · · · · · · · · · · · · · · · · · ·
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8 5/8*	710	200	1700	FREW	140	Treditate Nation	If playent, Rein
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4			 	 		TO ITA	none
		·	 	 			·
	T.		\$~: 2	 			
				<u> </u>			

	WELL CASING RECORD — BEFORE REWORK								
Car	n	Com	grad	Perfors	rtions.	Acid or Fracture	Perforations		
Size	Depth	Sacks	Types	Frank	T-o	Treatment Record	Performance If playing, News		
8 5/8*	710	200					-2.		
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548	15501	55		none		none	none		
									
<u> </u>			en e na	<u> </u>					

WELL CASING RECORD — AFTER REWORK (Indicate additions and changes only)															
Сене		Cernest		Perforecions		Perforetions		Perforetions		Perforetions		Perforations April or Francisco		Add or Fracture	Perference 🔆
Siso	Depth	Sacks	Type	Frank	Te	Treatment Record	M salvegged, row?								
9 5/8"	77.01	200													
							144								
518	15501	55		none		none	none								
		[
		I													

DESCRIBE REWORK OPERATIONS IN DETAIL

We deepened the well from 1587 ft. to 1600 ft. We got some salt water so we plugged back 10 ft. to 1590.

IMPORTANT! SEE REVERSE SIDE

B-52 2002 - LAGIN - HIM 30928 - LAGINA MARE MY (STOP - BOX 2002H - CARS) Meisich - dur Meisich - dur Meisich - dur Meisich - dur 4302E -- 8 % 30026 - 80% 30028

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U.S. ENVIRONMENTAL PROTECTION AGENCY NOTICE OF INSPECTION

Address (EPA Regional Office)
U.S.E.P.A. Region V
77 W. Jackson
WU - 16 - J
Chicago, IL 60604

Talib Syed & Associates, Inc. 3595 S. Teller Street Suite #405 Lakewood, Co 80235 (303) 969-0685 Firm To Be Inspected

IME POTASH

Date 10-21-2002 Hour 9120 A

Notice of inspection is hereby given according to Section 1445(b) of the Safe Drinking Water Act (42 U.S.C. §300 f et seg.).

Reason For Inspection

For the purpose of inspecting records, files, papers, processes, controls and facilities, and obtaining samples to determine whether the person subject to an applicable underground injection control program has acted or is acting in compliance with the Safe Drinking Water Act and any applicable permit or rule.

miT - TO2-009

WELL 1841 MOER # 366.904.767 P.

Section 1445(b) of the SDWA (42 U.S.C. §300 j-4 (b) is quoted on the reverse of this form.

Receipt of this Notice of Inspection is hereby acknowledged.

Firm Representative

Date

Inspector

Bul Huffs

10-21-2002

Charles L. Lewer

ANNULAR PRESSURE TEST

OPERATOR IME	POTASH		STATE PERMIT NO. 366 904 767
ADDRESS			EPA PERMIT NO. M1-133-36-A002
HERSE	y , m1.		DATE OF TEST 10-21-2002
WELL NAME	LL # 104	TYPE 3 - 6	
LOCATION 5 W	QUARTER C	FTHE NW	QUARTER OF THE NW QUARTER.
SECTION24	TOWNSHIP	171	RANGE 9 in
TOWNSHIP NAME	HERSEY		COUNTY NAME OSCEOLA
COMPANY REPRESENTAT	IVE \$146	Hicks	FIELD INSPECTOR PROWN
TYPE PRESSURE GAUGE	4x8 * INC	CH FACE, NA	PSI FULL SCALE, PSI INCREMENTS
			FOF TEST CALIBRATION 10-11-2000
		1	□ NO□ & PARESCIENTEIC DIGITAL
RESULTS:			
	PRESSURE	(PSIG)	
TIME	ANNULUS	TUBING	CASING 7
0	1320.3	NA	TUBING 2 7/8
15	1820,1	NA	PACKER ARROW SET I COMP.
30	1820,0	NA	PACKER @ 6(10"
	•		
			FLUID RETURN @ MA
· · · · · · · · · · · · · · · · · · ·			
			COMMENTS: TD 2-009
			5 yR.
-			
TEST PRESSURE:			
MAX. ALLOW	ABLE PRESSURE C		UR PRESSURE CHANGE — 0, 3 PSI
IF FAILED, NO INJECTION	TEST FAILED (ONS HAVE BEEN MADE AND WELL PASSES.
Rie Hick	V		10-21-2007
SIGNATURE	OF COMPANY REPF	RESENTATIVE	DATE
Pha. l. 4	Berner		10-21-2002
SIGNATURE	OF INSPECTOR		DATE

Paroscienufic, Inc.

4500 148th Avenue `E.

Facsimile: (425) 867-5407 Redmond, WA 98052 J194 Email: salessupport@paroscientific.com Telephone: (425) 883-8700 Internet: http://www.paroscientific.com

CERTIFICATE OF CONFORMANCE

CUSTOMER:	IMC PATASH HERSEY			
PURCHASE ORDER:	38875			
TRANSDUCER MODEL:	760-2K			
PART NUMBER:	1107-033-0			
SERIAL NUMBER(S):	47973			

PAROSCIENTIFIC INCORPORATED certifies that the part(s) identified above complies with the requirements of the above order and has been manufactured in accordance with engineering drawings, material and process specifications, testing procedures, and applicable specification drawing of Paroscientific Incorporated. The transducer(s) identified has been calibrated and tested over the specified pressure and temperature range and meets the requirements of the applicable specification drawing. Primary pressure, temperature standards and transfer standards used at Paroscientific Incorporated for calibration and testing have traceability to the National Institute of Standards and Technology and are regularly checked and calibrated according to Paroscientific QA Procedure Q8521, Inspection Test and Measurement Equipment, in accordance with the requirements of ISO 9001.

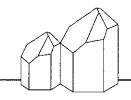
Maner Schulman

10/11/00

AUTHORIZED SIGNATURE

DATE

Warren Schuchman, Quality Assurance



Digiquartz® Pressure Instrumentation

Document No. T8148, Rev."M", 5May00

Page 1 of 2

PAROSCIENTIFIC, INC. 4500 148th Ave. N.E. Redmond, WA 98052 Tel: (425) 883-8700 Fax: (425) 867-5407

Customer:

IMC POTASH HERSEY

1395 135TH AVENUE HERSEY, MI 49639

Date:

10-11-2000

Sales Order: 17238 S/R 6311

STATUS REPORT OF INTELLIGENT TRANSMITTER

Serial Number: 47973 760-2K Model:

Pressure Range: 0 to 2,000 psia

Port:

oil filled

Configuration

Calibration Coefficients

VR:	60.07	PA:	.0000000
SN:	47973	PM:	1.000000
ID:	01	TC:	.6890829
BR:	9600		
PT:	И		5.818638
	•	Y1:	-3938.544
DP:	6	Y2:	-12827.45
		Y3:	-72887.10
MD:			
MC:	Y		-8514.146
			-126.7054
UN:		C3:	19475.25
	1.000000		
	00238	-	.0496718
TR:	00952	D2:	.0000000
0.5	2100 000	TTI a	00 00000
	2100.000		29.98833
ZS:	-		.8126916
Z V:	.0000000		44.05520
			17.41595
		12:	715.5318

Prepared by: T.Chau



Paroscientific ac.

4500 148th Avenue N.E., Redmond WA 98052 U.S.A. Tel. (425) 883-8700, FAX (425) 867-5407

SERVICE REPORT SR 6311 Amendment 01 8/29/2000 LK

Amendment 02 9/9/2000 LK

DATE OF RECEIPT

: August 22, 2000

CUSTOMER

: IMC Potash/Salt

: Kyle Barbot

1107-033-0

CUSTOMER CONTACT

TEL 231-832-1237

FAX 231-832-3349

CUSTOMER ORDER #

47973

MODEL S/N PN

S/D 6/93

CUSTOMER COMMENT Bad battery, call with est.

ANALYSIS

760-2K

Unit arrived in-operative. The pressure port line had been spun resulting in the internal tubing twisted and the panel fitting pulled from the panel. Salt corrosion has damaged the case, internal electronics and pressure lines.

CORRECTIVE ACTION

Replace the complete mechanical and electronic package, install the 42K transducer s/n 47973 and restore to original PN 1107-033-0 \$1625. Vacuum oil fill \$150. Zero adjust calibration \$395. Total \$2170.

Note, a complete new model 760-2K, PN 1107-033-0 is listed at \$5575.

DATE ANALYSIS COMPLETED

August 22, 2000 L. Kezner

CHARGES

\$2170

S. O. INSTRUCTIONS

Replace the complete mechanical and electronic package, install the 42K transducer s/n 47973 and restore to original PN 1107-033-0. Vacuum oil fill. Zero adjust calibration.

Paroscientific, Inc.

∥-Paroscien*⊾f*ic,Inc.

4500 148th Avenuε E. Redmond, WA 98052-5194

Facsimile: (425) 867-5407

Email:salessupport@paroscientific.com Telephone: (425) 883-8700 Internet:http://www.paroscientific.com

CERTIFICATE OF CALIBRATION

TRANSDUCER MODEL: 760-2K

SERIAL NUMBER: 47973

	oscientific transducer(s) identified above has been calibrate ture standards. All have traceability to the National Institute		• • • • • • • • • • • • • • • • • • • •
Bell and	Howell Primary Pressure Standard		
Pneumai	tic Absolute or Gauge Dead Weight Tester Part Number: 6	-201-0001,	S/N 4034 and S/N 1014
_	Piston/Cylinder: 6-001-0002, P2-919/C2-1523, Weight Set 1: 6-002-0002 Range: 1.5 to 50 psi [10 to 345 kPa] Accuracy: 0.010 percent of reading		
<u> </u>	Piston/Cylinder: 6-001-0002, P2-652/C2-1378, Weight Set 2: 6-002-0002 Range: 1.5 to 50 psi [10 to 345 kPa] Accuracy: 0.010 percent of reading	_	Piston/Cylinder: 6-001-0001, P1-949/C1-922, Weight Set 2: 6-002-0002 Range: 0.3 to 5 psi [2 to 34 kPa] Accuracy: 0.015 percent of reading
	ary Pressure Standard tic Absolute or Gauge Dead Weight Tester Part Number: P0 Piston/Cylinder: S/N 305, Mass Set: S/N 2052 Range: 0.7 to 50 psi [5 to 345 kPa] absolute mode, 0.29 Accuracy: 0.002 percent of reading		

DH Primary Pressure Standard

Pneumatic Gauge Dead Weight Tester, Model 5203, S/N 5557

Piston/Cylinder: S/N 4845, Mass Sets: S/N 2032, S/N 3293

Range: 20 to 1,600 psi [0.14 to 11 MPa] Accuracy: 0.005 percent of reading

DH Primary Pressure Standard

Oil Operated Gauge Dead Weight Tester, Model 5306, S/N 3505

Piston/Cylinder: S/N 3375, Mass Set: S/N 2032 Range: 40 to 20,000 psi [0.3 to 138 MPa]

Accuracy: 0.01 percent of reading above 200 psi [1.4 MPa]

or 0.02 psi [0.14 kPa] at lower pressure

Piston/Cylinder: S/N 3511, Mass Set: S/N 2032

Range: 145 to 72,500 psi [1 to 500 MPa]

Accuracy: 0.02 percent of reading above 725 psi [5 MPa] or 0.145 psi [1 kPa] at lower pressure

Hart Scientific Precision Thermometer (MET3A only)

Black Stack model 1560 S/N 97155, Thermistor Probes Model 5611T:

S/Ns 972711, 972713, 972715, 972718, 972719 and 972721.

Range: -50° to 60° C. Accuracy: .015°C.



Digiquartz® Pressure Instrumentation Document No. 8145-001, Rev. G 10/14/99

Paroscienufic,Inc.

4500 148th Avenue E. Redmond, WA 98052-5194

Facsimile: (425) 867-5407 Email: salessupport@paroscientific.com Telephone: (425) 883-8700 Internet: http://www.paroscientific.com

CERTIFICATION OF TRACEABILITY ΤÖ NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY

Primary pressure and temperature standards used in the calibration and testing of Paroscientific pressure transducers or Meteorological Systems have traceability to the National Institute of Standards and Technology through the following documentation.

Bell and Howell Primary Pressure Standard:

Bell and Howell, Model 6-201-0001, Piston/Cylinder P2-919/C2-1523 via DH Calibration Report No. 15441 traceable to NIST. Weight Set 1, P/N 6-002-0002, via DH Calibration Report No. 14481 traceable to NIST. Weight Set 2, P/N 6-002-0002, via DH Calibration Report No. 14576 and 16603 traceable to NIST. Piston/Cylinder P2-652/C2-1378 via DH Instruments Calibration Report No. 14575 and 16602 traceable to NIST. Piston/Cylinder P1-231/C1-384 via DH Instruments Calibration Report No. 13170 traceable to NIST. Piston/Cylinder P/N 6-201, No. P1-949/C1-922, via DH Instruments Calibration Report 15440, traceable to NIST.

DH Primary Pressure Standard, Oil Operated Gauge:

DH Instruments, Model 5306, Piston/Cylinder S/N 3375, via DH Calibration Certificate Report No. 8398 and 22146 traceable to NIST. Piston/Cylinder 3511 via DH Calibration Report No. 8399 and 22147 traceable to NIST. Mass Set S/N 2032 via DH Calibration Report No. 4630 traceable to NIST.

DH Primary Pressure Standard, Pneumatic Operated Gauge:

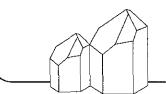
DH Instruments, Model 5203, Piston/Cylinder S/N 4845, via DH Calibration Certificate No.8541 traceable to NIST. Mass Set S/N 2032/3293 via DH Calibration Certificate Nos.4630 and 8540 traceable to NIST.

DH Primary Pressure Standard, Pneumatic Operated Gauge:

DH instruments, Model PG7601, Piston/Cylinder S/N 305 via DH Instruments Calibration No. 20281 traceable to NIST. DH Instruments 35 kg Mass Set No. 2052 and Bell No. 261A via DH Instruments Calibration Report No. 20282 traceable to NIST.

Hart Scientific Precision Thermometer (MET3A only):

Hart Scientific, Black Stack Model 1560 Serial Number 97155, Thermistor Probe Model 5611T Serial Numbers 972711, 972713, 972715, 972718, 972719 and 972721, traceable to NIST via report numbers 972053, 980530, 980531, 980532, 980533, 980534 and 980535.



ANULAR PRESSURE TEST

12

OPERATOR KALI	in EHEM.	ST	ATE PERMIT NO. 366 - 904 - 767
	•	•	A PERMIT NO /// 133.3G. 4002
HERSEY	1 m/ 496	39 DA	TE OF TEST 3-29-95
	1041		PE 3-6
			HE NW QUARTER.
	TOWNSHIP /7/		
TOWNSHIP NAME	FRSEY	CO	UNTY NAME OSCEOLA
COMPANY REPRESENTA	ATIVE HARRY BE	1N FI	ELD INSPECTOR C. BROWN
TYPE PRESSURE GAUG	SE 4x8 INCH FACE	PSI FU	LL SCALE, PSI INCREMENTS
NEW GAUGE	YES [] NO [IF NO, DATE OF T	EST CALIBRATION
CALIBRATIO	ON CERTIFICATION SUE	MITTED: YES	NC 🗆
RESULTS: * Dig	ITAL QUARTS	<u> </u>	
	PRESSURE	•	CASING
TIME	ANNULUS	TUBING	
		ShuT-100	TUBING <u>2/8</u>
			PACKER BAKER A-3 Camp.
30	*		PACKER @ 6230
	1965 11		
<u>60</u>	1965 "		FLUID RETURN @
			COMMENTS:
TEST PRESSURE:			4.50
MAX. ALLOWAB	LE PRESSURE CHANGE:		
<i>f</i>	/	HALF HOUR PRESS	SURE CHANGE PSI
TEST PASSED	TEST FAILED [] (CH		
IF FAILED, NO INJ	ECTION/MAY OCCUR UNT	IL CORRECTIONS F	AVE BEEN MADE AND WELL PASSES.
1 dem	Lea		3-29-95
SIGNATURE	OF COMPANY REPRESEN	ITATIVE	DATE
Harles E.	Hour		3-19-95
SIGNATURE	OF INSPECTOR		DATE

U.S. ENVIRONMENTAL PROTECTION AGENCY

NOTICE OF INSPECTION

Address (EPA Regional Office)

Region V, 5WD-TUB-9 230 S. Dearborn St. Chicago, IL 60604 Inspection Contractor

THE CADMUS GROUP, INC.

CORPORATE OFFICE 135 Beaver Street Waltham, MA 02154 (617) 894-9830 Firm To Be Inspected

KALIUM CHEM

HERSEY MI.

Date 7-3-90

Hour 9:30

Notice of inspection is hereby given according to Section 1445(b) of the Safe Drinking Water Act (42 U.S.C. §300 f et seg.).

Reason For Inspection

For the purpose of inspecting records, files, papers, processes, controls and facilities, and obtaining samples to determine whether the person subject to an applicable underground injection control program has acted or is acting in compliance with the Safe Drinking Water Act and any applicable permit or rule.

mit. class VIII - G

WELL # 1041

Section 1445(b) of the SDWA (42 U.S.C. §300 j-4 (b) is quoted on the reverse of this form.

Receipt of this Notice of Inspection is hereby acknowledged.

Firm Representative

Date

Inspector

7-3-90

Charles & Sour

ANNULAR PRESSURE TEST

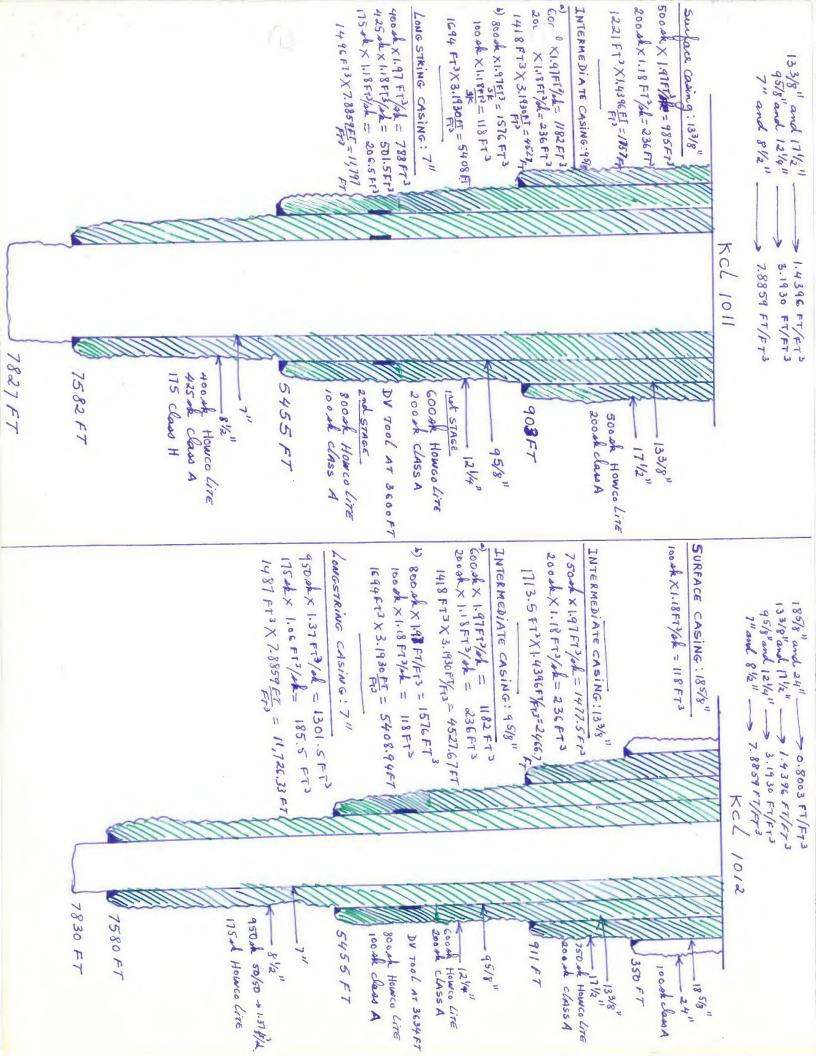
OPERATOR KALIU	M CHEM		STATE PERMIT NO. 366 . 904 . 767
ADDRESS 1461			EPA PERMIT NO. MIA - 133 - 36 - 0001
HERSEY,	M1. 496	39	DATE OF TEST 7-3-90
WELL NAME WELL	# 1041		TYPEG
LOCATION SW	QUARTER OF THE	QUARTER OF	THE NW QUARTER.
SECTION 26	TOWNSHIP /7A)	range 9W
TOWNSHIP NAME	HERSEY		COUNTY NAME OSCEOLA
COMPANY REPRESENTATI	IVE JIM MU	MM	FIELD INSPECTOR C. BROWN
TYPE PRESSURE GAUGE_	INCH FACE	:, <u>/500</u> PSI	FULL SCALE, 20 PSI INCREMENTS
NEW GAUGE	YES 💢 NO 🗆	IF NO, DATE OF	TEST CALIBRATION
CALIBRATION	CERTIFICATION SUE	MITTED: YES] NC [
RESULTS!			
Name			
	PRESSURE	(PSIG)	~ <i>''</i>
TIME	ANNULUS	-	casing tubing
10:10 A.	1445 ps1.		TUBING <u>2 1/8</u> "
10:40 A.	1430 ".	420 87	- PACKER 3 CUP MANOREL PACKER
11:10 A.	1425 "	as 69	PACKER @
			FLUID RETURN @
			COMMENTS:
		<u> </u>	
700			
TEST PRESSURE:			
	PRESSURE CHANGE:	TEST PRESSURE	E x .03 43,35 PSI
			ESSURE CHANGE -20 PSI
· · · · · · · · · · · · · · · · · · ·			
	TEST FAILED 🗌 (CH	•	
IF FAILED, NO INJECT	IION MAY OCCUR UNT	IL CORRECTIONS	S HAVE BEEN MADE AND WELL PASSES.
	MAN STATE		7-3-90
SIGNATURE OF	F COMPANY REPRESEN	TATIVE	DATE
charles of	Burn		7-3-90
SIGNATURE OF	INSPECTOR		DATE

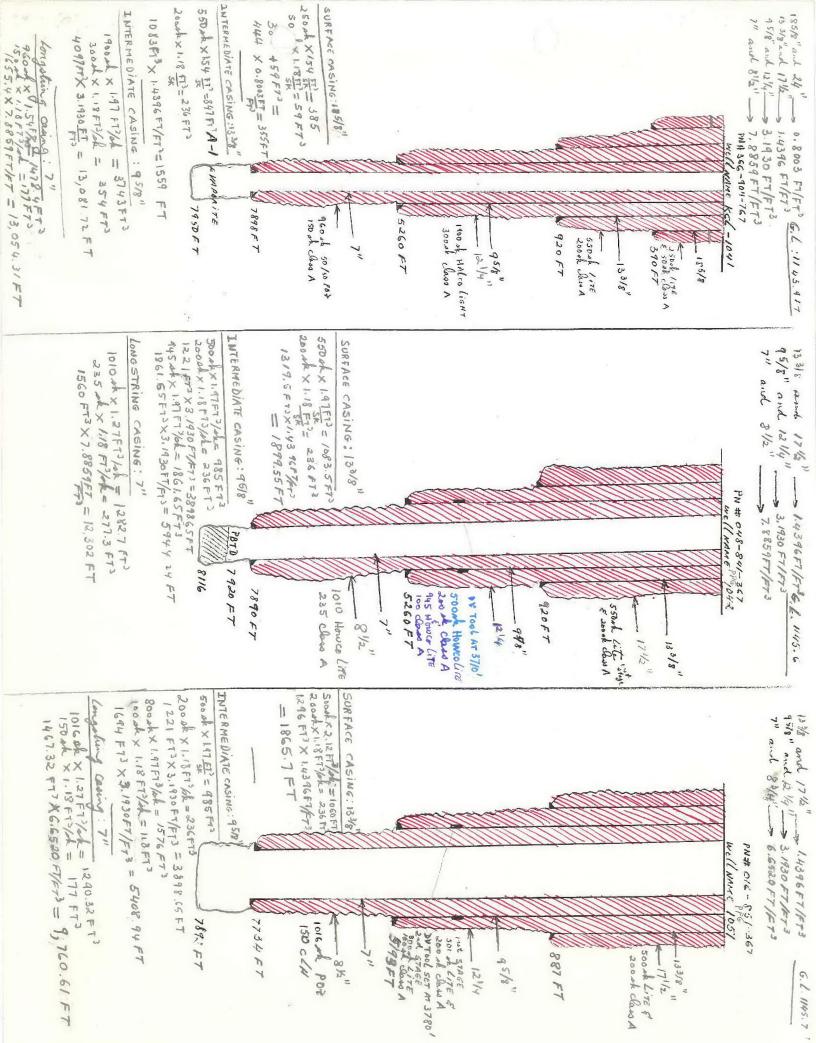
	UIC Permit Number	MI-133-3G-A002
Township and Range Selyof 522; 5/2 of 523, 6/2 of 527,		KALIUM CHEMICALS, Ltd.
Location Alls 26 . NE/40FS34; N/20FS35, TITN R 9W.	Well Name	HERSEY POTASH FACILITY
County OSCEOLA	State Permit Numbe	348-848-367;343-846-767;048-856-56 1 366-904-767;086-858-567;068-858-56
		P. SAIEH
,		
CLASS II PERMIT T	ECHNICAL REVIEW SHE	ET
DIRECTIONS: If a technical parame please indicate by er ALL SECTIONS OF THIS	itering 'NA' on the	corresponding line.
I. STATUS OF WELL: 2		
Newly Drilled/Converted/Existing	no/Comparcial	19042 1985
II. AREA OF REVIEW: Not applicable		
	•	trate the injection zone.
T.A.ed O Cons		
P.A.ed 2 Acce	ptable State Affida	vit Provided? Yes.
Producers 6 Cons	truction Adequate?	YES.
Injectors 2 Cons	truction Adequate?	YES.
111. UNDERGROUND SOURCES OF DRINKIN	G WATER (USDW):	YES
Formation name of lowest	USDW: GLACIAL	DRIFT.
Depth to bottom of lowest	usow: 672	FEET.
Method used to determine	USDW information:	FORMATION RECORDS FROM NEARBY WELL
IV. GEOLOGIC DATA OF CONFINING AND		
1 %	JECTION	CONFINING ZONE & SYSTEM
FORMATION NAME A.	- LEVAPORITE :	A-1 CARBONATE
	SALT	LIMESTONE & DOLOMITE
	7479	7422.
	_	
THICKNESS	4/7	57
FRACTURE GRADIENT	0.8	N/A

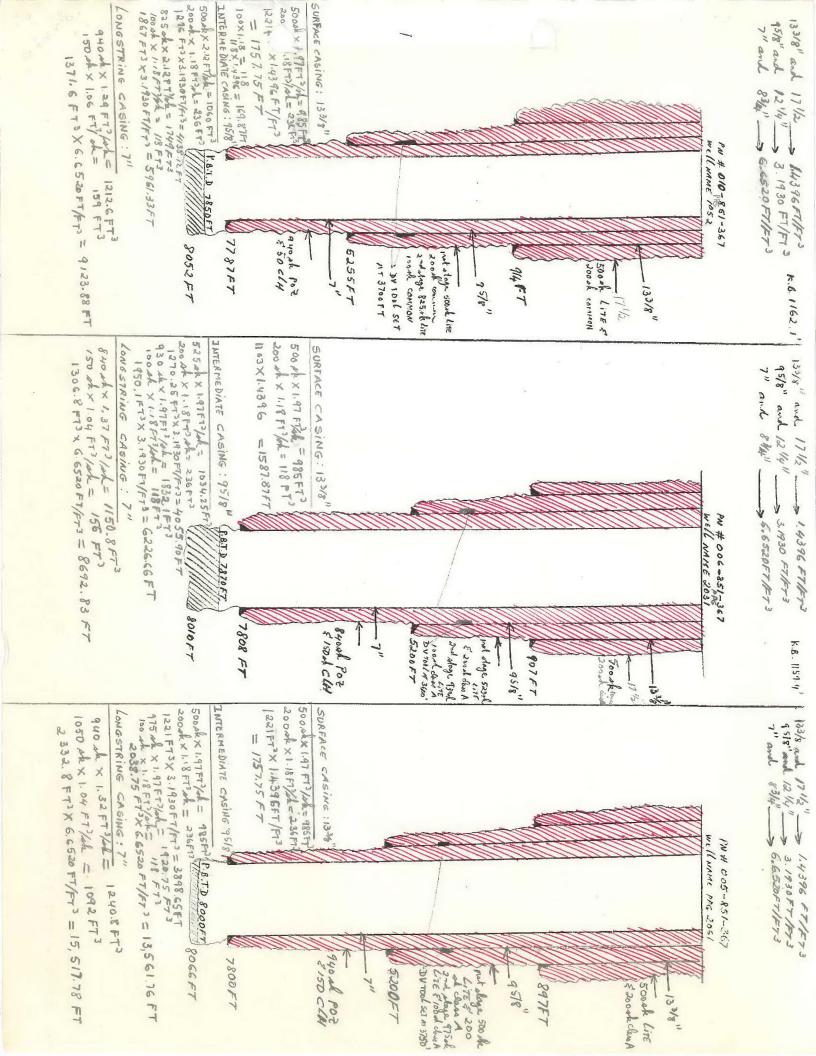
-2-	
DETERMINATION OF FRACTURE PRESSURE:	
N/A Field Rules: Only applicable	e for EOR Wells.
N/A Fracture Data: Use the I.S.I	
YES Equation: [(0.8 psi/ft - (0.	.433(Sg))) x depth] - 14.7 psi = psig.
N/A Other (explain)	
. OPERATING DATA:	
Maximum Allowable Injection Pressure:	1823 Psig
Specific Gravity of Injection Fluid:	1.23 +0.05 = 1.28 .
Composition of Annulus Fluid: N/A	
. WELL CONSTRUCTION:	See attached pages for individue well construction ated?
Total Nepthft.	well construction
Type of completion: Open Hole / Perfora	ated ?
Location of Perforations / Open Hole:	ft.
Packer Depth:ft. Set w/in or	r below the immediate confining system?
Location of Top of Cement adjacent to ca with at least a 20% excess)	cemented intervals
Surface:ft.	
Intermediate: ft.	SIZE
Long String:ft.	DEPTHCASING
Liner: ft.	HOLE
Proof of Cement Provided by:	
Signed State Completion Report	
Cementing Ticket.	DEPTH _ CASING
Cement Bond Lng.	HOLE
Temperature / Noise Lng.	PACKER DEPTH X X CASING
	PRTD TD

VII. MECHANICAL INTEGRITY: Pass / Fail.	
Type of MIT TO BE SCHEDULED IN THE	PERMIT
Type of HIT	**************************************
Conditions	•
Date of MIT	incip listed below are met
VIII. PLUGGING & ABANDONMENT PLAN: If all 5 of the the Plugging &	Abandonment Plan.is adequate.
N/A Uncemented Casing Ripped out.	
N/A Uncemented Casing Ripped out. VES Plug @ least 250' above injection	zone OR mechanical plug W/ 50 on cop.
N/A Plug & least 50' above & below r	ip point.
N/A INDIANA: Plug @ least 50° below	lowest USDW to surface.
N/A INDIANA: Plug @ least 50 Delow	-lug B least 50' below lowest
N/A INDIANA: Plug & least of Surface YES MICHIGAN: IF NOT CMT. TO SURFACE USDW to surface. IF Of the surface from 50' to the surface.	O. INTO THE 301.
Justify any variation from the above:	
Justify and terms	· · · · · · · · · · · · · · · · · · ·
IX. FINANCIAL ASSURANCE:	COVERAGE
Type FINANCIAL STATEMENT.	
Amount N/A	
Provider N/A	
Standby Trust Provided N/A	
IF Blanket Bond Coverage:	
are an acceptable-	
N/A Amount equal to 10 times	the cost to plug the most expensive eld or 75% of the total cost.
injection well in a second well wells covere	d under the blanket bond provided.
N/B	724
IF State Bond Coverage:	same Road provided.
from operator (o	f intent to use State Rond) provided.
Copy of State Bond prov	ided.
PENEDIAL ACTION / SPECIAL PERMIT CONDI	TIONS:
Y REMEDIAL ACILIA	Part of the second seco

None_ Required.







ATTACHMENT D

MAPS AND CROSS SECTIONS OF USDW's

Reference:

SOLUTION MINING PERMIT APPLICATION

U. S. POTASH SOLUTION MINING TEST FACILITY

Osceola County, Michigan

Volume I, Attachments A-D, for

PPG Industries, Inc., Pittsburgh, Pennsylvania, by Fenix & Scisson, Inc., Tulsa, Oklahoma.

Job #435, January, 1985 Permit No. MIA-133-3G-0001

EPA Checklist Items:

D. A piezometric map of the water table

Maps and cross-sections of USDW's 2.

The 1985 UIC Application referenced above contains all required information pertaining to checklist items D.1. and D.2.

Individual records have been attached for all new potable water wells drilled in the proposed permit area since the January, 1985 UIC application.

GEOLOGICAL SURVEY NO. WATER WELL AND PUMP RECORD PERMIT NUMBER LOCATION OF WELL County Fraction Section Number Town Number Range Numb Township Name NE WSE WNEW KETCSEY CEOLA istance And Direction From Road Intersection 3 OWNER OF WELL: LYMILE SOUTH OF HERSEY RD. ON 140th MARTIN DAILEY Address 1 40 A AUE AUE. - WEST SIDE OF 1404 AVE. Street Address & City of Well Location Address Same As Well Location? Yes No Locate with "X" in Section Below Deta Completed Sketch Map: WELL DEPTH: Regiacement Well INCHEY CO Cable tool Rotary Driven Dug etted Hollow rad Auger 6 USE: Domestic Type I Public Type III Public Irrigation Type Ila Public Heat pump Test Well Type IIb Public ihreaded **∠** Steel Height: Above/Rajous Plastic Welded in. to <u>70</u> DEPTH TO eDTTOM OF STRATUM THICKNESS ft, depth Weight 32 lbs./ft. 2 FORMATION DESCRIPTION 95 ft. dapth OF STRATUM _in. to . Grouted Drill Hole Diameter Drive Shoe ft. depth 8 SCREEN: Not installed 40 Type 🗸 Set between ft. and Lead Packer FITTINGS: K-Packer Blank above screen 9 STATIC WATER LEVEL: Flow ft, below land surface 10 PUMPING LEVEL: below land surface L hrs. pumping at LO ft. after ____ ___ hrs. pumping at __ 11 WELL HEAD tless adapter 12" above grade COMPLETION: Basement offset Approved oit 12 WELL GROUTED? No Yes From Bentphite Dther_ Nest cament No. of bags of cement, 13 Nearest spurce of possible contemination Distance So ft. Direction _ Well disinfected upon completion? Was old well plugged? Yes Not Installed Pume installation Only Manufecturer's name HP 74 Length of Drop Pipe ___ ft. capacity_ Ziei. Submersible TYPE: PRESSURE TANK: Menufacturer's neme Model number Gallon Capacity USE A 2NO SHEET IF NEEDED 15. Remarks, elevation, source of data, etc. 16. WATER WELL CONTRACTOR'S CERTIFICATION: This wall was drilled under my jurisdiction and this report is true 17, Rig Operator's Name:

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

AUTHORIZEO REPRESENTATIVE

GEDLDGICAL SURVEY ND. WATER			MP RECORD PERMIT NUMBER //
1 LOCATION OF WELL			
OSCROTA Township Name	tale of the second	Fraction AIF	Section Number Town Number Range Number 1084 JE14 23 F 7N/S 9 F
trance And Direction From Read Intersection	44.23		3 DWNER DF WELL
West side of Act.	nde .	X 14	Lloyd Sopre
wist side of Rd.			Address 2381 W. ACESCY Rd
Street Address & City of Well Lecation		14.3	Address Same As Well Location? A Yes No
	etch Mep:		4 WELL DEPTH: Date Completed New Well
	90		3/FT. 6: 3:91 Replacement Well
			Gable tool Retary Driven Dug Hollow rod Auger Males Jetted
	73.00		6 USE: X Domestic Type I Public Type III Public
	7 1		6 USE Oomestic Type L Public Type III Public I Irrigation Type IIa Public Hest pump
	١		Test Well Type IIb Public
	1970) 1970)	ont i	7 CASING: XSteel Threaded Height: Above/Bakows
MILE:	THICKNESS	овртн то	in to 22 ft. depth
2 FORMATION DESCRIPTION	OF STRATUM	BOTTOM OF . STRATUM	in. to 3/ ft. depth Weight 130 lbm/ft.
			Grouted Drill Hote Diameterin. tott. depthDrive Shoe
SAUO	3.8/	<i>/</i>	A SCREEN:
in the state of th	201	מק"	Type Diameter
The same and the s	1		Slet/Gauze 80 Length
SAND		<u>'U</u>	Set between 27 ft. and 31 ft.
			FTTTINGS: X K-Packer. Lead Packer X Bremer Check Blank above screen 2 ft. Other
	2 2 2 2 2	1 25 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	9 STATIC WATER LEVEL:
	774		7 ft. below land surface How
		1	10 PUMPING LEVEL: below land surface
A STATE OF THE STA	320	100	ft after hrs_pumping at G.P.M.
	14	<u> </u>	
			11 WELL HEAD Pitiess adapter . 12 above grade
	1		Basement offset Approved pit
		<u> </u>	No La Yes From ta
			Neat camont Bentanite Dther Fruital
		 	No. of bags of cement Additives 13 Neerest source of possible centamination
			Type Sp711 Distance SO ft: Direction W
			Well disinfected upon completion? X Yes No
· .	· · · · · · · · · · · · · · · · · · ·		Was aid well plugged? Yes No
			Net installed Pump installation Dnly
			Manufacturer's name Model number CPTOS HP 23 Volts ///D
			Length of Drop Pipe 21 ft. capacity
		1	TYPE: Submersible X Jet
	- 100 A		PRESSURE TANK: Menulacturer's name
USE A 2NO SHEET IF NEEDED		الم	Madel number <u>427</u> Capacity <u>6</u> Galle
15. Remarks, elevation, source of data, etc 15.			R WELL CONTRACTOR'S CERTIFICATION:
		te the t	best of my knowledge and beliaf.
			REGISTERED BUSINESS NAME REGISTRATION NO
17. Rig Operator's Name:	· 1 _{4.}	Address	man un and and water
		Signed	Street Anistra now 6/2/91
067d 2/89		- 41g.134	AUTHORIZED REPRESENTATIVE Authority: Act 388 PA 1978

Page 24

Authority; Cempletion: Penalty: Act 388 PA 1978
Recurred
Conviction of a violation
of any provision is a
misdemeanor

EXOLOGICAL SURVEY NO.	WATER \	WELL A	ND PU	MP RECORD 1978 67 17 09 26 003 PERMIT NUMBER
· 1	Township Name Hersey	***	Fraction	Section Number. Town Number Range Number W 1/4 SW 1/4 26 17 N/X 9 K
Stance And Direction From Road In			4 3	3 OWNER OF WEEL:
Well Number			- 4	2258 Interprise Dr.
P.P.G. Thom			·	
Water Suppl	У		-	Mt. Pleasant, Mi. 48858
traet Address & City of Well Locatio	n	·		Address Same As Well Location? Yes 🗷 No
ocate with "X" in Section Balow	, Sk	atch Map:		4 WELL DEPTH: (completed) Date of Completion
				285 n 1-8-85
				5 Cable teol X Rotary Driven Dug
	The second secon	$(m+1)^{-1}$	1.65	Hollow rod
'		7.	15.E3M	Domestic Type Public Type III Public
	Read to the transfer of the North Control of the N			Irrigation Type lia Public Heat pump
	-			Test Well Type IIb Public
			1.	7 CASING: Steel Threaded Height: Above/Below
1 MILE				Plastic Welded Surface 1 tr
2 FORMATION DESC	PIPTION	THICKNESS	DEFTH TO	in. to 377ft. depth Weight 1 lbs./ft.
2 COMMITTON DESC	AME HON	STRATUM	STRATUM	iin, to ft, depth .
		_	50	Grouped Drill Hole Dismeter 6-1/4 in. to 277 ft. depth No
Brown sand - grav	er - clay	5	5	in to ft. depth
Dear		0.5	400	6 SCREEN: Not installed
Brown sand - grav	<u></u>	95	100	Type Stainless W/W 31 0D
Cuar miles alas	haarm	45	445	Sipt/Genee 10 Length 8 ft.
Gray silty clay -	orown sand	15	115	Set between <u>277</u> ft. and <u>285</u> ft.
Cmnv silte	le alas	4.0	155	FITTINGS: K-Packer Lead Packer Bremer Check
Gray silty - sand	ty cray	40	1	Blank above screen 3 ft. Other
Gray sand		20	175	
	tion to the contract of	20	173	158 ft. below land surface Flow
Gray silty sandy	clay	10	185	No test conducted ft. afterhrs. pumping at G.P.M.
Gray silty clay -	some sand	45	230	ft. after hrs. pumping at G.P.M.
		 		11 WELL HEAD Pitless adapter 12' above grade
Gray sandy & silt	y clay	15	245	CDMPLETION: Basement offset Approved pit
				12 WELL GROUTED? No x Yes Fro 276.5 to 0
Cray sand		<u> </u>	295	
***				Neat cemant Bentonite Dither
		 	 	No. of bags of cement 29 Additions 13 Newscars
			ļ	13 Nearest source of possible contamination
Pitless Adaptor		<u> </u>		None near Distance ft. Oirection
				Well disinfected upon completion? Yes No
Baker Monitor		 	-	14 PLIMP
/# F &+ -				Not installed Pump installation Only
6* with 5 ft. Bu	<u> </u>	 		Manufacturer's name Red Jacket
Comma Lul -3	b -44			Model n 50011 13FC HP 5 Volts 230
Swage 6x4 nipple	on DOLLOM	 	-	Langth of Drop Pipa 231 ft. capacity 20 G
to 4" casing.	Econology			TYPE: Submersible Jet PRESSURE TANK:
Jez .	+12 9730	1	`	Manufacturer's name 251 IIG Xtrol
USE A 2ND SHEET I	F HEEDED		L	Model number CapacityG
15. Remarks, elevation source of	t data, etc.			R WELL CONTRACTOR'S CERTIFICATION:
(E)			This we	all was drilled under my junsdiction and this report is true best of my knowledge and belief
	LAND AND THE		1	
	1		B	POWD Drilling Co. Trc 26 REGISTERED BUSINESS NAME REGISTRATION NO.
<i>````</i> ``;			Addres	sHovell
14	المتفادة في			Thered March 2-1
			Signed	AUTHORIZEO REPRESENTATIVE

MICHIGAN DEPARTMENT OF PUBL HEALTH 4876 GEOLOGICAL SURVEY NO. VATER WELL AND PUMP RECUID PERMIT NUMBER 67170926004 LOCATION OF WELL Section Number Town Number Township Name SE WNEWEWW Osceola H=1-5=4 Stance And Direction From Road Intersection 3 DWNER OF WELL: Kalium Chemicals Address P.O. BOX 333 45 on wests de of 135th Address Same As Well Location? (4963) Street Address & City of Well Location Locate with "X" in Section Selow WELL DEPTH: (completed) Date of Completion Sketch Map: **ゴノク** in . En Cable too! Rotary Driven Oug Auger Hollow rod ☐ Jetted 6 USE: Demestic Type ! Public Type III Public Type lla Public ___ Irrigation Heat pump Test Well Type lib Public 135 15 1400 CASING: Steel Threaded Diameter Plastic Welded Threaded Height: Above/Beiow Surface _____ft. in. to 300 ft. depth DEPTH TO BOTTOM DE STRATUM THICKNESS Weight // lbs./ft. 2 FORMATION DESCRIPTION DF STRATUM __in. te ____ Grouted Drill Hele Diameter
7 in. to 300 ft. cepth Yes Drive Shoe □ No Net installed 42 Type Johnson 55 Diameter Slot/Gauce __/ O 95 Set between 302 ft. ann 3/7 ft. FITTINGS: X K-Packer Lead Packer Seemer Check Blank above screen Other 9 STATIC WATER LEVEL. 198 10 PUMPING LEVEL: below land surface Flow 30 290 _ ft. after _____ hrs. oumping at ____ _ ft. after _____ hrs. pumping at ____ 3/7 11 WELL HEAD Pittess apapter 12° appve grape COMPLETION: Approved pit Basement offset 12 WELL GROUTED? X Neat cement Bentonite Dther_ Ne. of bags of cement 24 Adoitives 13 Nearest source of possible contamination Type Septic Distance 85 " Direction West Well disinfected upon completion? Yes No 14 PUMP: Not installed Pump installation Only Manufacturer's name ______ Medel number <u>FF 55</u> ft. capacity . TYPE: Submersible PRESSURE TANK: Manufacturer's name _ Model number. Galions USE A 2NO SHEET IF NEEDED 15. Remarks, elevation, spurce of data, etc. 16. WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my jurisdiction and this recort is true to the best of my knewledge and belief. REGISTERED BUSINESS NAME REGISTRATION NO

2/84

AUTHORIZED REPRESENTATIVE

CHIGAN DEPARTMENT OF PUBLIC HE LITH GEOLOGICAL SURVEY NO. WATER WELL AND PUMP RECORD PERMIT NUMBER 667170923007 LOCATION OF WELL Section Number Town Number Range Number Township Name Fraction ROW FIM T17N N/S Hersey SE 1/4 SE1/4 NW1/4 Osceola 3 OWNER OF WELL: Distance And Direction From Read Intersection i mile north junction od Hersey Rd & Steve Juhasz 135th Ave. 135th Ave - then 200 ft west. Address Hersey, MI 49639 10/87 Address Same As Well Location? Trans Yas No Street Address & City of Well Lacation Data of Completion Locate with "X," in Section Below Sketch Man: 4 WELL DEPTH: (completed) 45 9/17/87 Cable tool Rotary Dnven Dug Dug Auger Jetted Hollow rod Hersey Rd 6 USE: Domestic Type I Public Type III Public Irrigation Type Ile Public Heet pump Test Well Type IIb Public 7 CASING: Steel Threaded Height: Above/2004 135th Ave. Plastic Welded

in. to 41 ft. depth Surface _____ft. DEPTH TO BOTTOM OF Weigh 3 - 75 lbs./ft. THICKNESS 2 FORMATION DESCRIPTION _ in. to _ ft, depth STRATUM STRATUM Grouted Drill Hole Diameter Yes Drive Shoe _ in. to ____ __ ft. depth 20 □ No 20 Sand ft. depth B SCREEN: Not Installed 22 2 Type Stainless Spiameter Red Clay 7____ Langth . 28 6 Sand Set between ft. and _ FITTINGS: K-Packer Lead Packer Bremer Check 10 38 Red Clay & Sand Blank above screen 15 ft. 9 STATIC WATER LEVEL: 45 ft. below land surface 10 PUMPING LEVEL: below land surface 25 ft. after 1 hrs. pumping at 10 G.P.M. ft. after _____ hrs, pumping at _____ G.P.M. 11 WELL HEAD Pitless adapter 12" above grade COMPLETION: Basement offset Approved pit 12 WELL GROUTED? No Yes From 0 to 30 ft. Bentonite Other _ Neat Cement SW Septio Distance 60 ft. Direction _ Yes No Well disinfected upon completion? 14 PUMP: Not Installed Pump Installation Only Manufacturer's name Flint & Walling HP 3/4 Volts 220 Model number CPJ07 Length of Drop Pipe __32 Submersible Jet_ PRESSURE TANK: Manufecturer's name Clayton Mark #03 Model number _ Gallons USE A 2NO SHEET IF NEEDED 16. WATER WELL CONTRACTOR'S CERTIFICATION: 15. Remarks, elevation, source of data, etc. This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief. 0923 Pekrul Well Drilling REGISTERED BUSINESS NAME Address R 3 Box 95 -Reed City. Signed AUTHORIZED REPRESENTATIVE

D67d 2/84
Page 27

Authority: Cempletion: Penalty; Act 388 PA 1976
Required
Conviction of a violation
of any provision is a

	TARINE OF PURPLE HER THE ANALYSIS OF THE STATE OF THE STA
GEOLOGICAL SUBVEY NO	AND PUMP RECORD PERMIT NUMBER
1 LOCATION OF WELL	
ISCENTA HERSEY	Nun Music File 3 5 Town Number Range Number
Distance And Direction From Road Intersection	SCHOFFE'S OWNER OF WELL ROCKNEY LIWING
Well LOCATED SOUTH	OF Address 6425 W. EARNES
INTERSECTION 300 FT.	EATON KAPIDS MILLERAY
Street Address & City of Well Location Locate with 'X' in Section Below Sketch Map:	Address Same As Well Location? Tres No 4 WELL DEPTH: 1 Date Completed
Skelli Mal	145FT. 2 14 90 Replacement Well
1.3	
	Hollow rad Auger Jatted
*	6 USE: Domestic Type Public Type III Public
	☐ Irrigation ☐ Type IIa Public ☐ Heat pump ☐ Test Welt ☐ Type IIb Public ☐
	7 CASING: Diameter Discrete Height: Above/Relow
1 MILE	Plastic Welded Surface / ft.
2 FORMATION DESCRIPTION THICKNES OF STRATUM	BOTTOM OF Weight 5 105./TL
STRAIDM	Grouted Drill Hole Diameter Drive Shoe
Clay Flor 15	15in. to ft. deoth
	8 SCREEN:
SANd Yellow 3)	Type Type Diameter
SANIDALIAV MISED 90	Slot/Gauze Length 130
	FITTINGS: K-Packer Lead Packer Bramer Check
- IAY GRAY 4	9 STATIC WATER LEVEL:
continue of the	/ // // He below land surface
54NA 7211 PW	10 PUMPING LEVEL: below land surface
	ft. after hrs. pumping at G.P.M.
	11 WELL HEAD Pitless adapter Alabove grade
	Basement offset Approved pit
	No No to 25-Tt.
	Neat cement - Sentonite Other - Other
	No. of bags of cement Additives
	Type Se BTIL Distance 6/ ft. Direction EMST
	Well disinfected upon completion?
	Was old well plugged? Yes No
	Not installed Pump installation Only
	Manufacturer's name P/N 7 W P/// W P/// Model number 2 HP 2 Volts 230
,	Length of Drop Pipe 126 ft. capacity 6 G.P.M.
	TYPE: Submersible Jet
	PRESSURE TANK: Manufacturer's name
USE A 2ND SHEET IF NEEDED	Model number Capacity Gallons
15. Remarks, elevation, source of data, etc.	16. WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
	60 Cancara Comment
	REGISTERED BUSINESS NAME REGISTRATION NO
17. Rig Operator's Name:	Address H C CARC MA (Ch)
DETO 289	Signed Kathat Described 7-14-90
CO14 242	Authority: Act 366 PA 1978

Completion: Penalty:

Required
Conviction of a violation of any provision is a

ATTACHMENT E

NAME AND DEPTH OF USDW'S (CLASS II)

This attachment does not apply to Class III wells.

4. Formation Data in Area of Review

4. I offilation Data ii	TAICA OF NEVIEW		1-1	TUNPOR ITE
Well Name/ Number	Base of Glacial Drift (TVD)	Thickness A-1 Carbonate	Top A-1 Salt (TVD)	Base A-1 Salt (TVD)
Lutz 1-34	653 (est)	57	7479 TOP	7854
Paine 1-26	595 (est)	56	7496	7827
Thomas 2-26 (1011)	625	53	7490	7808
Thomas 3-26 (1012)	620	54	7490	7808
Paine 1-35	672 (est)	53	7560	7887
Baldino 1-36	640 (est)	51	7558	7896 Lower
2031	609	55	7486	7807

Injection 2000 - 3 7479

ATTACHMENT F

MAPS AND CROSS SECTIONS OF GEOLOGIC STRUCTURE OF AREA

Reference:

SOLUTION MINING PERMIT APPLICATION

U. S. Potash Solution Mining Test Facility

Osceola County, Michigan

Volume II, Attachments E-U, for

PPG Industries, Inc., Pittsburgh, Pennsylvania,

January, 1985

Permit No. MIA-133-3G-0001

EPA Checklist Items:

- F. 1. Regional geology
 - a. surface geology
 - b. cross-sections
 - c. structural contour map
- F. 2. Local geology
 - (a) two perpendicular cross-sections
 - (b) description of upper and lower confining strata (lithology, permeability, etc.)
 - (c) description of faulting in area
 - (d) depositional, structural and tectonic history of the area
 - (e) structural contour map of marker bed above salt area
 - (f) isopach map of injection zone
- F. 3. Geohydrology reservoir mechanics of injection zone
 - (a) depth
 - (b) geologic name
 - (c) porosity
 - (d) permeability
 - (e) temperature
 - (f) reservoir pressure

- (g) faulting, fracturing, solution channels
- (h) fracture gradient
- (i) piezometric surface map

The 1985 UIC Application referenced above contains all required information pertaining to the proposed permit area.

ATTACHMENT G

Does not apply to Class III wells.

- 6. The injection fluids to the solution mining wells will consist of the following:
 - low quality solutions from the solution mining operation
 fresh water from water wells and site run-off from rainfall
 recycled solution from the refinery
 boiler blow down fluid
 facility purge and flush water

ATTACHMENT I

FORMATION TESTING PROGRAM

EPA Checklist Items:

- I. 1. Collection and analysis of formation fluid
- I. 2. Cores and core testing
- I. 3. Injectivity testing
- I. 4. The injection zone is water bearing
 - (a) fluid pressure
 - (b) fracture pressure
 - (c) physical and chemical analysis
- I. 5. The injection zone is not water bearing
 - (a) fracture pressure

The formation does not have any native fluids and is a tight formation. The ore present in the formation is dissolved into the injected fluids rather than forcing fluids into the rock strata. Core samples, when taken, are analyzed for chemical assay only.

The solution mining operation will be conducted at a pressure well below the recommended limit of 0.8 psi per foot of depth. No attempt will be made to fracture the mining zone for the purpose of determining fracture pressure. See also Attachment J.

ATTACHMENT J

STIMULATION PROGRAM

EPA Checklist Items:

- J. 1. Fracturing
- J. 2. Acidizing
- J. 3. Other

Solution mining of potash ore is accomplished by dissolving the ore into the injected fluid rather than forcing the injected fluid into a rock strata. Therefore, fracturing of the mining zone is not required and will not be done.

ATTACHMENT L

CONSTRUCTION PROCEDURES

Two different construction procedures will be used for wells. Wells constructed prior to 1986 have already been completed according to the procedures listed below. Wells that will be constructed in the future (beginning in 1986) will have an improved casing program that is detailed at the end of this section.

EPA Checklist Items:

Typical for Wells Constructed Prior to 1986

- L-1. 1. Total Depth 7,825' (est.)
- L-1. 2. Type Completion Cased hole.

L-1. 3. Surface Casing:

a.	Size	13-3/8"

b. Type K-55, ST&C, 8 Rd. Thread

c. Weight 54.0#/ft.
d. Setting depth 900' (est.)

e. Centralization Five bottom joints centralized with a weld-on guide shoe on

bottom.

NOTE: i. 24" conductor pipe driven to a depth of 100'.

ii. 17-1/2" hole drilled to a depth of 905' (est.).

L-1. 4. <u>Intermediate Casing</u>:

a. Size 9-5/8"

b. Type N-80, LT&C, 8 Rd. Thread

c. Weight 40.0#/ft. d. Setting depth 5,450' (est.)

e. Centralization Eight contralizers on every

second joint from bottom with a float shoe on bottom and a float collar at the top of the

first joint.

NOTE: i. 12-1/4" hole drilled to a depth of 5,455' (est.).

L-1. 5. Long String (Production) Casing)

a. Size 7"

b. Type N-80 grade or better, LT&C,

8 Rd Thread

c. Weight 23#/ft.

d.

7,590' (est.) Setting depth

Centralization e.

A float collar and centralizer on bottom and a float collar with manual fill one joint up with a centralizer midway between joints and held in place with stop rings.

NOTE:

8-1/2" hole drilled to a depth of 7,825' (est.) and then plugged back to 7,610' (est.) with 50 sacks of HOWCO Lite cement.

L-1. 6. Liner or Other Casing:

N/A

L-1. 7. Logging Program:

Not logged in open hole or after Surface Hole: a.

casing run.

Intermediate Hole: b.

Open hole -Schlumberger Dual Micro Laterolog from 3,200' to 4,140' (est.).

> Schlumberger Litho-Density/Compensated Neutron/GR Log from 100' to 5,455' (est.).

Cased hole -No logs.

C. Production Hole:

Open hole -Schlumberger Litho-Density/Compensated Neutron/GR Log from 5,455' to 7,825' (est.)

Cement Bond Log and Gamma-Ray Cased hole -Neutron/Casing Collar Location logs run from total depth to surface after drilling out float equipment and cement below casing.

d. Directional Surveys:

Well directionally drilled; surveyed with magnetic single shot instruments while drilling. Verification surveys taken with gyroscopic multishot instruments in cased hole.

L-1. 8. Cementing Data:

a. Surface Casing:

The casing is cemented with 500 sacks of HOWCO Lite and 200 sacks of Class A cement. Cement returns to surface.

b. <u>Intermediate Casing</u>:

The casing is cemented to surface in two stages. The first stage is cemented with 600 sacks of HOWCO Lite and 200 sacks of Class A cement. Cement returns to surface. The DV tool (stage cementing tool) is then closed and the second stage cemented using 800 sacks of HOWCO Lite and 100 sacks of Class A. Cement returns to surface.

c. Long String (Production) Casing:

Casing is cemented with 450 sacks of HOWCO Lite (salt saturated), 450 sacks of HOWCO Poz (18% salt) and 280 sacks of HOWCO Special H. Cement returns to surface.

L-1. 9. Tubing:

- a. Size 2-7/8" or 4-1/2"
- b. Type 2-7/8" is J-55 grade or better, 6.5#/ft., EUE or 4-1/2" is K-55 grade or better, 10.6#/ft., 8 Rd.
- c. Setting depth 7,830' (est.)

L-1. 10. Corrosiveness of Injected Fluids

Injection fluid is water or brine with injection temperatures between 50°F and 180°F. Chemical treatment will be used to maintain corrosion rates less than 10 mils/year on the steel well casing.

EPA Checklist Items:

Typical for Wells Constructed in 1986 or later:

- L-2. 1. <u>Total Depth</u> 7,825' (est.)
- L-2. 2. Type Completion Cased hole.
- L-2. 3. Surface Casing (A) Optional:
 - a. Size 18-5/8"

K-55, ST&C, 8 Rd. Thread Type b.

86.0#/ft. C. Weight

600' (est.) d. Setting depth

Centralization None e.

NOTE:

- i. 24" hole drilled to 605' (est.)
- This is a remedial string set through aquifer ii. and above potential lost circulation zone.

Surface Casing (B):

a. Size 13-3/8"

Type K-55, ST&C, 8 Rd. Thread b.

Weight 54.0 #/ft c. 900' (est.) Setting Depth d.

Bottom 5 joints are strapped Centralization e.

across collars

NOTE:

i. 17-1/2" hole drilled to 905' (est.)

Intermediate Casing: L-2. 4.

9-5/8" Size a.

Mixed N-80 & K-55 LT&C, 8 Rd. b. Type

40.0#/ft. Weight c.

5,225' (est.) d. Setting depth

Eight contralizers on every Centralization e.

second joint from bottom with a float shoe on bottom and a float collar at the top of the

first joint.

12-1/4" hole drilled to a depth of 5,230' i. NOTE: (est.).

> Approximately 500' of N-80 is run at bottom of string with K-55 above it to surface.

Long String (Production) Casing: L-2. 5.

7" Size a.

L-80 grade or better, LT&C, b. Type

8 Rd Thread

23-29#/ft. depending upon c. Weight

depth

d. Setting depth 7,590' (est.)

Float shoe on bottom with centralizer midway on first Centralization e.

joint and float collar on top. Centralizers on every other joint for approximately 400-500'. Centralizers are held

in place with stop rings.

NOTE: 8-1/2" hole drilled to a depth of 7,825' (est.)

and then plugged back to 7,610' (est.) with 50 sacks of HOWCO Lite cement.

L-2. 6. Liner or Other Casing:

N/A

L-2. 7. Logging Program:

a. <u>Surface Hole</u>: Not logged in open hole or after casing run.

b. <u>Intermediate Hole:</u>

Open hole - Dual Micro Laterolog from 3,200' to 4,140' (est.).

Litho-Density/Compensated Neutron/GR Log from 100' to 5,230' (est.).

Cased hole - No logs.

c. <u>Production Hole</u>:

Open hole - Litho-Density/Compensated Neutron/GR Log from 5,230' to 7,825' (est.)

Cased hole - Cement Bond Log and Gamma-Ray Neutron/Casing Collar Location logs run from total depth to surface after drilling out float equipment and cement below casing.

d. <u>Directional Surveys</u>:

Well directionally drilled; surveyed with magnetic single shot instruments while drilling. Verification surveys, if desired, taken with gyroscopic multi-shot instruments in cased hole.

L-2. 8. <u>Cementing Data</u>:

a. Surface Casing(A):

The casing is cemented with 600 sacks of HOWCO Lite and 240 sacks of Class A cement. Cement returns to surface.

Surface Casing (B):

The casing is cemented with 500 sacks of HOWCO Lite and 200 sacks of Class A cement. Cement returns to surface.

b. <u>Intermediate Casing</u>:

The casing is cemented to surface in two stages. The first stage is cemented with 600 sacks of HOWCO Lite and 200 sacks of Class A cement. Cement returns to surface. The DV tool (stage cementing tool) is then closed and the second stage cemented using 800 sacks of HOWCO Lite and 100 sacks of Class A. Cement returns to surface.

c. Long String (Production) Casing:

Casing is cemented with 450 sacks of HOWCO Lite (salt saturated), 450 sacks of HOWCO Poz (18% salt) and 280 sacks of HOWCO Special H. Cement returns to surface.

L-2. 9. Tubing:

a. Size 2-7/8" or 4-1/2"

b. Type 2-7/8" is J-55 grade or better, 6.5#/ft., EUE or 4-1/2" is K-55 grade or better, 10.6#/ft., 8 Rd.

c. Setting depth 7,830' (est.)

L-2. 10. Corrosiveness of Injected Fluids:

Injection fluid is water or brine with injection temperatures between 50°F and 180°F. Chemical treatment will be used to maintain corrosion rates at less than 10 mils/year on the steel well casing.

ATTACHMENT M

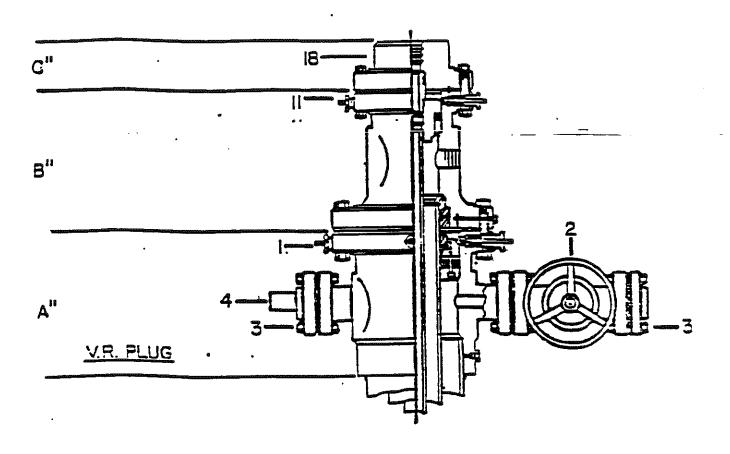
CONSTRUCTION DETAIL

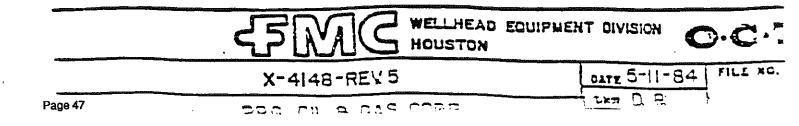
EPA Checklist Items:

- M. 1. Well Construction
- M. 2. Wellhead

The following documents identify the construction details for the wellhead and borehole.

Figure M-1	Wellhead Details
Figure M-2	Parts Listing
Figure M-3	Typical Casing and Cement Program for Wells Constructed Prior to 1986
Figure M-4	Typical Casing and Cementing Program Wells Constructed Beginning 1986





PARTS L 5-17-84 r Page 1

POTASH PRODUCTION **WELLHEAD DESIGN**

84-0140 X-4148-Rev.5

9-5/8" X 7" X

TREE	0	SIZE	2-7/8" x 7" /	WORKING PRESSURE	5000#
ITEM	PART NO.	QUAN.		DESCRIPTION	
				SECTION A	•
1	13-118-613	1	Slip-On wit	, Type C-22-8P, 9-9 h Test Port X 11" 5 with Two 2-1/16" 9 lets	5000# WP
1A	25-410-211	1	Plug, Type	V.R., 2"	
2	90-010-620	1		T., Model 20 with 0# WP, Flanged End	
3	26-015-601	2	Flange, Com	panion, 2-1/16" 500	00# WP X 2"
4	25-300-030	1	Bull Plug,	Type "8", 2" L.P.	
5	73-010-024	3	Ring Gasket	, API Metal, R-24	
6	78-010-235	24	(3 Set) Stu	ds and Nuts, Cad.,	7/8" X 6"
		<u>.</u>	тот	AL LIST PRICE SECT	ION A
i				SECTION B	
8	12-080-025	1	Casing Hang	er, Type C-22, 10"	x 7"
9	73-010-054	1	Ring Gasket	, API Metal, R-54	
10	78-010-823	. 12	(1 Set) Stu 13-3/4"	ids and Nuts, Cad.,	1-7/8" X
	·				

PARTS LI

5-17-84 mt Page 2

POTASH PRODUCTION WELLHEAD DESIGN

84-0140 X-4148-Rev.5

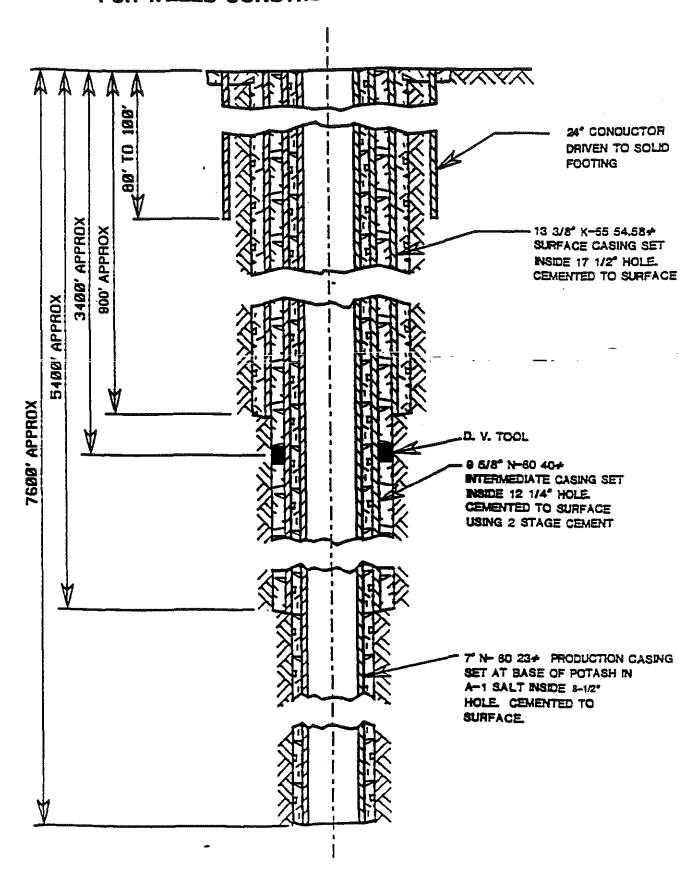
9-5/8" X 7" X 2-7/8"

WORKING

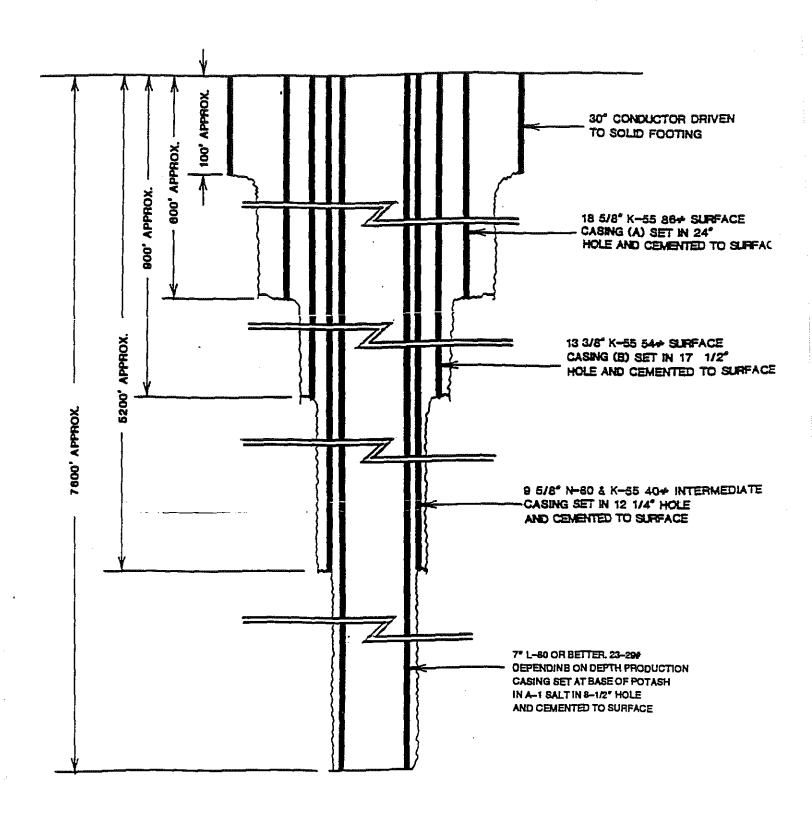
5000#

TREE >	10.	SIZE	2-//8" PRESSURE 500
ITEM	PART NO.	QUAN.	DESCRIPTION
11	83-360-672	1	Tubing Head, Type TCM-BG, 9" O.D., 11" 5000# WP Flanged Bottom X 7-1/16" 5000# WP Flanged Top with One 4" L.P. Female Outlet and One 2" L.P. Female Outlet
12	83-165-070	1	Bushing, Packoff and Reducer, Type "PE", 9" X 7" 0.0., Complete with Snap Ring TOTAL LIST PRICE SECTION B
			,
			SECTION C
15	82-740-160	1	Tubing Hanger, Type TC-1A-BP, 6" X 2-7/8" O.D. EUE 8RF Top and Bottom, with "IS" BPVG
5 A	73-043-070	1	Seal-Off Nipple, 2-7/8" O.D. EUE BRF X 4-7/8" O.D.
16	73-010-046	1 .	Riny Gasket, API Metal, R-46
17	78-01D-635	12	(1 Set) Studs and Nuts, Cad., 1-3/8" X 1D-3/4"
18	02-020-716	1	Adapter, Type A-2-P, 7-1/16" 5000# WP X 2-7/8" 0.D. EUE BRF with 4.875" I.D. Counterbore for #73-043-070 Seal Sleeve with Test Port (Ref. HOU-5780)
		 	TOTAL LIST PRICE SECTION C
			TOTAL UNIT PRICE SECTION A SECTION B SECTION C
			TOTAL UNIT PRICE COMPLETE

TYPI. AL CASING AND CEMENT ROGRAM FOR WELLS CONSTRUCTED PRIOR TO 1986



TYPICAL CASING & CEMENTING PROGRAM WELLS CONSTRUCTED BEGINNING 1986



ATTACHMENT N

CHANGES IN INJECTED FLUID

EPA Checklist Items:

N. 1. Pressure change:

The pressure of the injected fluid will change only as required to displace the withdrawal brine out of the withdrawal well. The static head imposed by the column of fluid in the withdrawal well will change as the density of the withdrawal fluid changes.

- N. 2. Native fluid displacement.
- N. 3. Direction of movement of injected fluid formation.

Solution mining of potash ore is accomplished by dissolving the ore into the injected fluid rather than forcing the injected fluid into a rock strata. The solution mining process will be contained in the mined out cavern in the A-1 Evaporite. There will be no movement of fluids either into or out of the cavern except by way of the cased wells. No native fluids are present in the A-1 Evaporite or the confining strata.

ATTACHMENT 0

PLANS FOR WELL FAILURE

EPA Checklist Items:

No items listed.

Containment facilities are provided at the solution mining wells as an integral part of the minefield cluster design. In the unlikely event that a spill would escape the containment facilities at any cluster site or the associated disposal wells, the following offices would be notified by the supervisor at the Potash Facility:

- a. Michigan DNR 800-292-4706
- b. EPA Region 5 312-353-2000
- c. National Response Center (Oil Spills) 800-424-8802

Appropriate written reports would be filed with DNR pursuant to R 323.1164.

In the case of a spill escaping the containment facilities or a spill from a disposal pipeline, plant personnel will take such action as necessary to confine the spill by using earth moving equipment. A vacuum truck would then be used to recover and transport the spilled fluid to the cluster site for handling. Contaminated dirt will be removed and disposed of in an approved landfill. Bulldozers, backhoes, vacuum trucks and like equipemnt are readily available in the area.

Well failure can be considered to be a malfunction of the well that has potentially adverse environmental consequences particularly with regard to USDW's. Two failure scenarios need to be examined. First, failure of the surface equipment (wellhead) may occur. Second, the subsurface equipment (vertical tubing goods and cement) may fail. Each failure mode will be discussed separately.

Plan for Dealing with Wellhead Failure:

The wellhead is a rugged, heavy duty assemblage of steel fittings, spools and valves. Failure of any sort is most unlikely, but the worst case imaginable would be impact by a high-speed, heavy vehicle. Such an impact might cause the wellhead to be sheared off at or near the ground. A "worst case" condition would result if the wellhead damage occurs when the cavern is at miximum size. With these worst case conditions at the time of failure, a geysor of injection fluid (water or dilute brine) would form over the ruptured wellhead. About 1000 gallons of injection fluid may flow from the injection pump side of the system before the pump trips off with the rest of the fluid coming back up the injection well. The entire volume of fluid in

the injection casing or approximately 13,500 gallons would rapidly be displaced out of the open well. The well would continue to depressurize at lower rates after the initial surge. Based on controlled depressurization of solution mining cavities at Kalium's Saskatchewan facility, it is estimated that the total volume of fluid released under the worst case conditions could be 100,000 gallons.

Fluids falling on the concrete pad surrounding the wellhead will be contained and collected. The sump in the wellhead pad will drain through a pipe to the main sump inside the cluster building. Fluids entering the building sump can be pumped to tanks having a total capacity of 150,000 gallons. From these tanks the fluids can be injected back into the solution mining wells or into disposal wells. A lined containment area surrounding the tank farm will hold another 225,000 gallons.

Corrective action to stop the flow and make repairs would be taken as soon as possible. However, the well would most likely depressurize on its own before a service rig could set a mechanical packer in the open casing.

Plan for Dealing with Subsurface Hardware Failure:

The possibility of a failure in the downhole equipment that could comtaminate the USDW is so remote that it is nearly inconceivable. The aquifer zone is protected by at least three and in newer wells four, concentric casings all cemented back to surface. The 7" inner casing and the 9-5/8" intermediate casing would both have to fail in order to allow fluids to reach the aquifers.

Minefield injection and return flows will both be monitored by recording flowmeters. Any loss of fluid as evidenced by the difference in the injection and return flowmeters will result in testing to isolate the source of the flow balance discrepancy. Individual injection and/or return casings will be tested for leaks as indicated. Conventional oil field techniques will be used to repair any damaged casing that could allow contamination of the USDW.

ATTACHMENT P

MONITORING PROGRAM

EPA Checklist Items:

P. 1. Frequent Analysis of Waste

Monthly composite samples of the injection and withdrawal fluids will be chemically analyzed.

P. 2. Recorders for

- a. injection pressure
- b. injection rate and volume
- c. annulus pressure

The injection flowrate and pressure to each well will be continuously monitored. The withdrawal flow from all wells will be combined and monitored. These flows along with the chemical analysis of injection and withdrawal fluids will be used to determine a material balance on each well or cluster of wells.

The annulus between the 7" production casing and the 9-5/8" intermediate casing and the 9-5/8" casing and the 13-3/8" surface casing will be filled with cement for this well design making it meaningless to monitor annulus pressure.

P. 3. Mechanical Integrity Testing

Mechanical integrity testing of the wells will be performed before the wells are put in service. The 7" casing will be pressure tested to 2,000 psig (surface pressure). This is 117% of the maximum operating pressure and 222% of the normal operating pressure when on water injection.

No routine pressure testing of the well will be performed. If the injection and withdrawal flow balance indicates a possible leak in underground equipment, the wells will be pressure tested and repaired as indicated.

P. 4. Monitoring Wells

Ground Water Monitoring

An extensive hydrogeologic investigation was conducted under the supervision of W. A. Meneley in the Cluster No. 1 mining area.

Based on Meneley's regional stratigraphic classification (Figure P-1), Cluster 1 is situated on sand corresponding to Unit

F/1/d, a high-energy glacial outwash deposit consisting of moderately to poorly sorted sand with locally variable gravel and silt concentrations. The uppermost barrier layer intersected at Cluster 1 is Unit F/1/c. This is a regionally continuous layer of clay, silty clay till, and silt deposited under stagnant ice and glaciolacustrine conditions and representing a significant barrier to downward migration of fluids. The top of Unit F/1/c is commonly intersected at depths of 95-105 feet below ground level at Cluster 1.

A water table exists at roughly 50-55 feet below ground level. Groundwater flow direction has consistently been determined to be in a west to northwesterly direction, toward Polick Creek, which lies between 1/4 and 1/2 mile to the west. Polick Creek flows north before joining the Muskegon River, about 1.5 miles away.

A ground water quality monitoring program was established at Cluster 1 based on the above information. Monitor wells were drilled to the top of the first barrier layer (Unit F/1/c) in the downgradient direction from the solution mining wells. Figure P-2 shows the location of the monitor wells installed at Cluster No. 1. Background water quality samples were collected and analyzed prior to commencing solution mining operations.

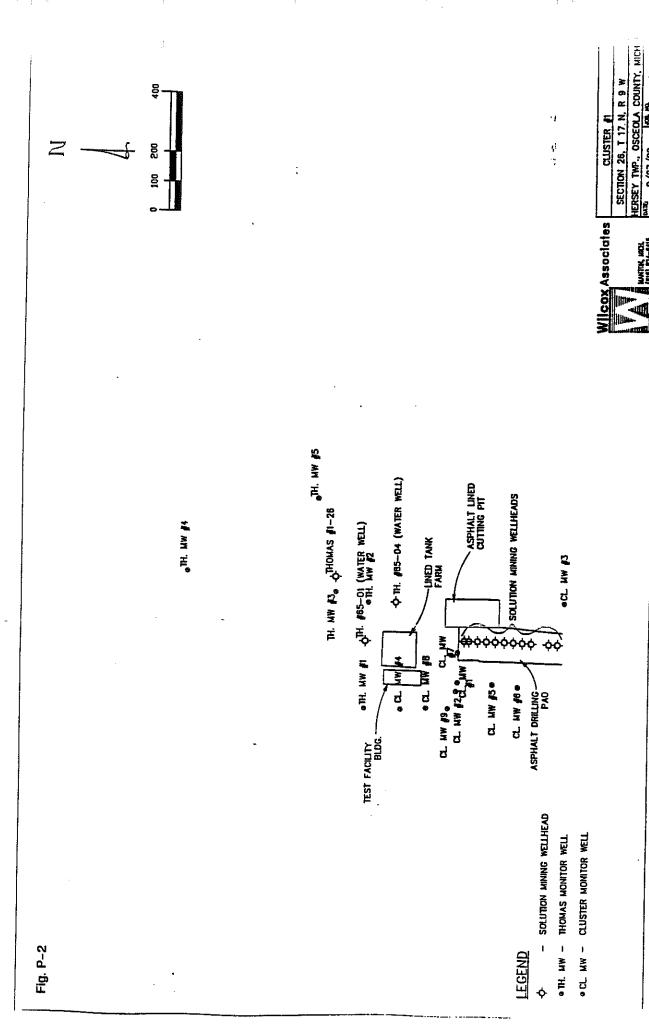
Ground water samples from the monitor wells have been obtained at least quarterly and field analyzed for specific conductivity and chloride concentration. Minor contamination from the initial drilling operations was detected by the monitor wells and removed by purging. No significant surface or groundwater contamination has been measured at Cluster 1 during the subsequent production operations. No major brine spills or leaks have occurred during the drilling and operation of the solution mining wells.

Kalium is committed to maintaining close surveillance of the existing monitor wells at Cluster 1. Similar monitoring systems have already been designed and installed at Cluster 2 in preparation for future operation of wells at this site. (See Figure P-3).

Ground water samples from both sites will continue to be gathered and field analyzed for specific conductivity and chloride concentration on a monthly basis and samples will be collected for complete chemical analysis on an annual basis.

DOMINANT LITHOLOGY	Sand and gr	Clay and ellly ciay, laminated to bedded, some interbeds of	Silly sandy clay, some pebbies, in part stratified	Sandy clay IIII, sparse coarse traciton	Clay and offry clay, faminated to bedded, seme interbeds of	Medium to coarse sand minor provel, interbede of silly clay	Clay and silly clay, laminated to bedded, some interbeds of	Medium to coares sand minor gravel, interbeds of shity clay	Clay and stilly ctay, faminated to bedded, some interbeds of	Medium to cearse sand, minor sitty ciay interbeds, minor fine pravel interbads K - 650 gpd/sq.it	Silly sandy clay, some pebbles, in part strailled	Medium to coarse sand minor gravel, interbeds of silty clay	ndy clay iiii, sparse costse
ENVIRONMENT	Valley train outwash	Giaciolacustrine	Stagnant Ice/outwash	1111	Glaciolacustrine	Outwash	Glaciojacustrine	Outwash	Glaciolacustrine	Outwash	Stagnant Ice	Outwash	Till
UNIT					G/1	F/ 1/d	F/1/c	F/1/b	F/ 1/a			E/1	
SUB-UNIT							Upper Unit F	(F/1)		Lower Unit F			
57	Y	7		G				LL			Ш		

Fig. P-1 Hydrogeologic units



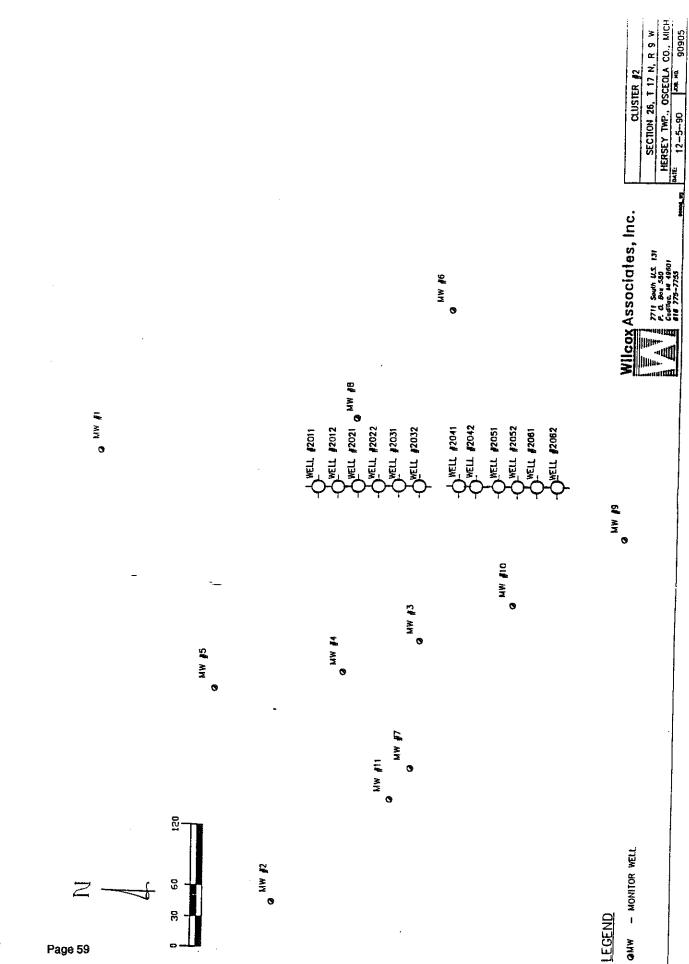


Fig. P-3

ATTACHMENT Q

PLUGGING AND ABANDONMENT PLAN

EPA Checklist Items:

- Q. 1. Plugs
 - a. type
 - b. location
- Q. 2. Cement
 - a. type
 - b. grade
 - c. quantity
- Q. 3. Placement
 - a. method
 - b. static equilibrium

The plan for plugging Class III wells is as follows:

- 1. The cavity shall be depressured until the well is completely dead.
- Run in with tubing and bridge plug to a point at, or near, the top of the cavity.
- 3. Set bridge plug in competent casing as close as possible to the top of the cavity.
- 4. Rig up cementing truck and set 50 sack plug of Class A cement above bridge plug. 50 sack plug, Class A = 226'.
- 5. Pull tubing up through cement to top of plug.
- 6. Continue to plug 7" casing, using 50-50 poz cement. Yield: 1.29 cu. ft./sack; 100 sack = 129 cu. ft. = 583'/100 sacks.
- 7. Continue to plug to within 226' of surface. Set 50 sack plug of Class A cement at surface. Cut off and cap 3' below surface.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY WASHINGTON. D.C. 20460

Wells drilled prid to 1986

LUGGING AND ABANDON

WEL! NAME & NUMBER. FIELD NAME, LEASE NAME & NUMBER Hersey Potash Facility Solution Mining Wells

NAME. ADDRESS. & PHONE NUMBER OF OWNER/OPERA Kalium Chemicals, Ltd. Suite 100, The East Tower 2550 Golf Rd.; Rolling Meadows, IL 60

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13-3,	78	54	900		900	17-15"		700	tte/Cla	L_A	he Balance Mo	
9-5/	8"	40	5450	5	450	12-½"		1700	Lite/Cla	L_A	he Dump Baile he Tue Otes S	
7"	\neg	23	7800	7	800	8-1/2"		1180	Li te/Boz	7)	he Two Plug N ither, Explain:	netnoc
	Ī								Class H		Attach 0-	.2
CEM	EN	T TO PLUG AN	D ABANDON	DATA:	Plug # 1	Plug	#	Pług#	Plug#	Plug#	Plug # 14	
		e or Pipe in Which Pla	ug Will Be Placed (in	cnesi	7"				_		7"	7"
		Top of Plug (ft.)			7574	二 P!!	igs 2	throug	h 13		1 291	0
Messur	ed T	op of Plug (ft.)				<u> </u>	574 t	576 f	eet	_		
Depth t	o Bo	ottom of Plug (ft.)			7780		intin	uous ce	ment in		576	291
Sacks o	of Ce	ment to be Used			50		00_sa	ick (583	') inter	vals	J 50	60
Slurry	Volu	me to be Used Icu. ft.)		53	Usi	<u> </u>	50 Paz	cement a	it _	64	64
		int (ib./gai.)			15.6	$5 \perp 14$	1.5 T	b/gal.			14.5	15.
	Cer	nent. Spacer or Other	Material Used		Llass /	1		-			50/50Poz	Clacs
		flush Uso	المراجع		Brine		- ۋىسىيىسى	أحسبت يستحدثن	The state of the s	Account to the second	00/00/02	<u>i Grass</u>

DESCRIPTION OF PLUGGING PROCEDURE

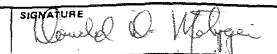
See Attachment Q-2 Estimated cost/well = \$22,000.00 Total cost for 8 wells = $$176_{*}^{1/2}000_{*}00$

Es	ESTIMATED COST OF PLUGGING AND ABANDONMENT							
Cement	\$	Cast Iron Bridge Plug	8					
Logging	8	Cement Retainer	8					
Aig or Pulling Unit	8	Miscellaneous	8					

CERTIFICATION

I certify under the penalty of law that I have examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information. I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (Ref.40 CFR 144.32)

NAME AND OFFICIAL TITLE (Please type or print)	
Donald D. Metzger	
Resid e nt Manager	



Wells drilled afte

1985

PLUGGING AND ABANDO TENT PLAN

WEL! NAME & NUMBER, FIELD NAME, LEASE NAME & NUMBER

Hersey Potash Facility Solution Mining Wells NAME. ADDRESS, & PHONE NUMBER OF OWNER/OPER.

Kalium Chemicals, Ltd.

Suite 100, The East Tower, 2550 Golf Roa Rolling Meadows, IL 60008-4051

Lo	cate Well And Outlin	ne Unit On	STATE	cour	ITY			STATE PERA	ALT NUMBER	
36	ction Plat — 640 Ac	res	MI	0sc	eola					
			SURFA	CE LOCATIO	N DESCRIPTIO	100				
	++++	++++	S	ee Atta	ched 0-1			+		
							ST LINES OF QU			ING UI
	TITI		S	ocation —			ttach 0-2			-
			A	and	ft. From	(E/W)	Line Of Q	uarter Sec	tion	-
w		E	T	TYPE OF AUTHORIZATION Individual Permit Rule			WELL	Y	Class i Hazardi Nonhaz	
-		++++	In	imber of W Area Perm	nit			ň	☐ Brine ☐ Enhance☐ Hydroca	ed Re
	S		U.	U.S.EPA Permit Number				☐ Class V		
CASI	NG/TUBING/C	EMENT RECOR	D AFT	ER PLUG	iging an	D ABANDO	NMENT		DD OF EMPL MENT PLUGS	
Sizo	WEIBAM TBQ/CSB	Original Amount (CSG)		Laft un Wall	Hote Sign om.t	State Catalog (a	ma Type	1	Da Balance 10	
18-5/8	86	800	600		24"	840	Lite/Clas	- A	he Balance Me he Dump Baile	
13-3/8	54	900	900		17-1/2	* 700	Lite/Clas	- 3V	he Two Piug A	
9-5/6	1 70	5450	5450)	12-1/4	1700	Lite/Clas	-	ther, Explain:	
7	23-29	7800	7800		8-1/2	1180			e Attach	ent (
CEMEN	NT TO PLUG AN	ID ABANDON I	ATA:	Plug# 1	Plug#	Plug#	Plug#	Plug #	Plug#14	
	ole or Pipe in Which Pl	lug Will Be Placed (inc	ines)	7	1		4	1	1 7	1 7
	Top of Plug (ft.)			/5/4		s 2 throu			291	1 0
Measured	Top of Plug (ft.)					4 to 576.		ď		0
Deptn to 8	Bottom of Plug (ft.)			//80		tinuous o		_	5/5	1521
Sacks of C	Cament to be Used			50	100	sack (58	33') inter	vals.	50	60
Slurry Vol	ume to be Used (cu. ft	n)		53			cement a	it _	64	64
	ignt (lb./gat.)			15.	5 14.	5 Tb/gal.	•		14.5	15
	ement. Spacer or Othe	r Material Used		Class			1		50/50Poz	The second second second
Type of Pr	ellusn Usa			Brine						

DESCRIPTION OF PLUGGING PROCEDURE

See Attachment 0-2

Estimated cost/well = \$22,000.00 Total cost for 8 wells = \$176,000.00

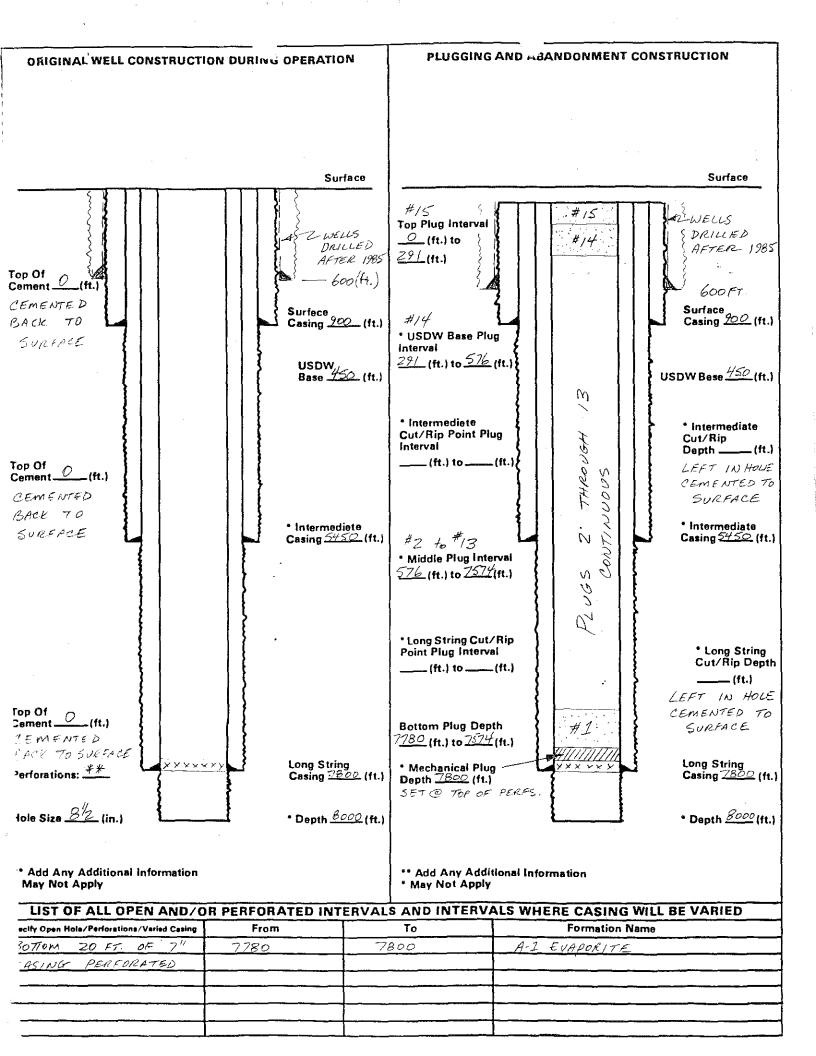
CERTIFICATION

I certify under the penalty of law that I have examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information. I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (Ref.40 CFR 144.32)

NAME AND OFFICIAL TITLE (Please type or orint)
Donald D. Metzger
Resident Manager

SIGNATURE DO MAYER

DATE SIGNED



8. Summary: Set bridge plug at 7,800'.

1st	plug	7,800-7,	574 ′	Class	A, 3%	Cl_2	50	sacks
	plug	7,574-6,	991 ′	50-50	pos	_	100	sacks
	plug	6,991-6,		50-50	poz		100	sacks
4th	plug	6,400-5,	825′	50-50	pos		100	sacks
5th	plug	5,825-5,	242′	50-50	pos		100	sacks
6th	plug	5,242-4,	659 ′	50-50	pos		100	sacks
7th	plug	4,659-4,	076 '	50-50	pos		100	sacks
8th	plug	4,076-3,	493′	50-50	pos		100	sacks
9th	plug	3,493-2,	910′	50-50	pos		100	sacks
10th	plug	2,910-2,	327 ′	50-50	pos		100	sacks
11th	plug	2,327-1,	744'	50-50	pos		100	sacks
12th	plug	1,744-1,	161′	50-50	pos		100	sacks
13th	plug	1,161-	576 ′	50-50	pos		100	sacks
14th	plug	576 -	291′	50-50	pos		50	sacks
15th	plug	291-	0'	50-50	pos		60	sacks

ATTACHMENT R

NECESSARY RESOURCES

EPA Checklist Items:

Certificate of necessary resources for plugging well.

Kalium Chemicals has submitted the required financial statements with the Class I permit applications, Numbers MI-133I1-0001, 0002 and 0003.

No additional documents are being submitted with this Class III permit application since it is believed that information furnished with the previous Class I permit application adequately covers the requirements.

CHIEF FINANCIAL OFFICER'S LETTER

U. S. Environmental Protection Agency
Underground Injection Control
Class Illnjection Well Operators

This letter contains information submitted as evidence of financial responsibility for the Environmental Protection Agency's underground injection control requirements.

Submitted to:

Regional Administrator

Environmental Protection Agency Region 5

230 S. Dearborn Street

5W0-7UB-5 Chicago, II 60604

Submitted for:

Kalium Chemicals, Ltd.

P.O. Box 333

11461 S 135th Avenue Hersey, Mi 49639

Type of Organization:

Corporation

Date of incorporation:

August 18, 1987

State of incorporation:

Delaware

Submitted by:

Dale W Ward

Kalium Chemicals, Ltd.

1200 - 1801 Hamilton Street,

Regina, Saskatchewan

S4P 4B5

I hereby certify that the financial information contained on the following pages is correct and derived from this firm's year-end financial statements prepared in the normal course of business for the latest completed fiscal year ended June 30, 1991.

<u>()නා පි/ ೯ (</u> (Date)

Vice President

Financa & Administration

I. Kalium Chemicals, Ltd. is the owner or operator of Class III injection wells in the following states within EPA Region 5:

TΟ

State Name: Michigan

II. This firm guarantees the plugging and abandonment of injection wells owned or operated by the following subsidiaries:

Subsidiary Name and Address:

N/A

- III. This firm is not required to file a form 10k with the Securities and Exchange Commission (SEC) for the latest fiscal year.
- IV. The fiscal year of this firm ended on June 30. The financial information contained in this letter is derived from this firm's year end financial statements prepared in the normal course of business for the latest completed fiscal year ended June 30, 1991.

 Note: Short year August 1, 1990 June 30/91 due to change in year end.

The name and address of the accounting firm examining these financial statements:

Arthur Andersen & Co. Chartered Accountants 2200 - 355 - 4th Ave. S.W. Calgary, Alberta T2P 0J1 V. The dollar amounts below are stated in thousands of dollars.

FINANCIAL INFORMATION

Balance Sheet Information:

1.	Current Assets	\$ 39,119	
2.	Total Assets	\$200,508	
3.	Current Liabilities	\$ 22,242	
4.	Total Liabilities	\$128,877	
5.	Net Worth or Stockholder's Equity	\$ 71,631	
Inco	me Statement Information:		
6.	Depreciation, Depletion, and Amortization	\$ 10,265	
7.	Net Income	\$ 19,370	actual (11 mths) actual
<u>Çalc</u>	ulations:		actual
8.	Total Liabilities less Current Liabilities (Item 4 - Item 3)	\$106,635	
9.	Depreciation, Depletion, and Amortization plus Net Income (Item 6 + Item 7)	\$ 29,635	(ll mths) actual
10.	Current Assets less Current Liabilities (Item 1 - Item 3) indicate negative numbers with parentheses)	\$ 16,877	
11.	Current Liabilities divided by Net Worth (Item 3 + Item 5)	0.31	
12.	Total Liabilities less Current Liabilities, all divided by Net Worth	1.49	
13.	Depreciation, Depletion, and Amortization plus Net Income, all divided by Total Liabilities	0.23	

0.08

VI. Based on the information in Part V, the company meets or does not meet the financial ratio requirements, as indicated.

		<u>YES</u>	NO
1.	Current Liabilities + Net Worth less than 1.0	X	
2.	Long-term Liabilities + Net Worth less than 2.0	x	
3.	New Income greater than zero.	x	
4.	Net Income + depreciation, depletion and amortization total + total liabilities	x	
5.	Working Capital + Total Assets greater than -0.10	x	
6.	Net Worth > 1 million dollars	X	

VII. This firm has not received a rating by either Standard and Poor's or Moody's.

The current bond rating of most recent issuance of this firm

N/A

KALIUM CANADA, LTD.

INTEROFFICE CORRESPONDENCE

REF:

DW2010

TO:

ROB PLOSZ

SUBJECT: MICHIGAN - EPA

FROM:

DALE WARD

DATE: NOVEMBER 8, 1991

Attached is a completed CFO Letter which you requested for the Michigan Project. You will need to provide the following information in support of the CFO Letter and may submit a copy of this memo with the letter if you wish.

The financial information is from the audited statements of KCL Holdings, Inc., a Delaware Corporation established August 18, 1987. KCL Holdings owns 100% of Kalium Chemicals, Ltd. which owns the Michigan assets. Kalium Chemicals, Ltd. owns 100% of Kalium Canada, Ltd., a Canadian corporation. KCL Holdings, Inc. has no other business activity and owns no other assets.

Audited statements are available at the KCL Holdings, Inc. level but there are no audited statements for Kalium Chemicals, Ltd. The financial impact of KCL Holdings on the consolidated results is negligible.

DWW/BS

ATTACHMENT S

AQUIFER EXEMPTIONS

This item does not apply since no aquifer exemptions are being requested.

ATTACHMENT T

EXISTING EPA PERMITS

EPA Checklist Items:

- 1. NPDES None
- 2. PSD None
- 3. RCRA None
- 4. Underground Injection Control (Potash Test Facility)
 - Disposal Wells MI-133-II-0001, 0002, 0003
 - Solution Mining Wells MIA-133-3G-0001

ATTACHMENT U

DESCRIPTION OF BUSINESS

PPG Industries, Inc. (PPG) discovered significant potash-bearing deposits in an area spanning the border between Mecosta and Osceola Counties in Michigan. The potash mineralization occurs within the A-1 Evaporite of the Salina Group of formations which lie 7500 to 7800 feet below surface.

PPG constructed and operated a solution mining test facility in 1985 and 1986 to confirm the workability of solution mining techniques and to demonstrate the feasibility of injecting disposal brine into a suitable porous and permeable subsurface rock formation. Potash minerals were not extracted from the brine produced during the test facility operation. PPG operated this facility under UIC Class I Disposal Well permits MI-133-1I-0001, MI-133-1I-0002 and MI-133-1I-0003, and Class III Solution Mining Well area permit MIA-133-3G-0001. Results from the test facility were encouraging, however, a downturn in the Potash industry forced PPG to terminate testwork in July 1986 and delay expenditures on a commercial production facility.

In November, 1987 PPG sold all of its Potash interests, including the Michigan project, to Sullivan and Proops (S & P) of Chicago. The EPA operating permits were transferred to Kalium Chemicals, Ltd. (Kalium), a fully owned subsidiary of S & P. In April, 1991, the privately held companies of S & P including Kalium became a publicly traded company on the NYSE under the Vigoro name. Kalium continues to operate with the Kalium name within the Vigoro Corporation.

In 1989 Kalium constructed a small commercial production facility to process the potash brines produced from the solution mining wells. The facility remains in operation today selling potash minerals into the U.S. agricultural market.

The Michigan potash facility supplements Kalium's primary potash production facility situated at Belle Plaine, Saskatchewan, Canada. Kalium's administrative offices are located in Chicago, Illinois and Regina, Saskatchewan, Canada.

5. Kalium markets potash worldwide with the major percentage used as fertilizer and the balance in chemical and industrial applications.

Kalium's mining process in Michigan involves pumping a solution through boreholes into potash beds 7500 feet below the surface, dissolving the potash-bearing portion of the ores and returning the solution to surface for refining. The solution is processed through a series of crystallizers where the potash crystals are formed. The crystals are then dried and sifted through a series of special screens to assure a consistent particle size.

The mining operation produces some solution that is not of high enough quality to be refined. (This weaker solution is disposed into a porous limestone formation 4000 feet) below surface.

Kalium ships bulk potash via hopper trucks directly to customers or to offsite storage warehouses.

EOLOGICAL SURVEY SAMPLE No.	07-0	25	
Control of the second of the s	WATER W	/ELL REC	ORD MICHIGAN DEPARTMENT
1.0CATION-OF WELL 67170935 001	ACT 294		
y (30 117 1) 3 3 1 Equivoship Name		Frection	Section Number Town Number Range Number
Osceola Hersey		NE'S	E 4 SE 4 35 17 N/2. 9 E/W.
bout 25 mile South of Scho		Road	3 OWNER OF WELL: Jim Bichenberg
d about 1 mile West of 130	th Ave	me	Address 8158 N. Morrish Road
Street address & City of Well Location			Flushing, MI 48433
Locate with "X" in section below Sketch	Map: Rd.		4 WELL DEPTH: (completed) Date of Completion
			Mollow rod Jetted Bored
*			6 USE: Domestic Public Supply Industry
	7	-	☐ Irrigation ☐ Air Conditioning ☐ Commercial
×	.1) 1	Test Well 7 CASING: Threaded W Welded Height: Above/Balow
S MILE	11~		Diam. Surfaceft.
2 FORMATION	THICKNESS OF	DEPTH TO BOTTOM OF	2 in. to 154 ft. Depth Weight 3.75 lbs./ft.
	STRATUM	STRATUM	in toft. Depth Drive Shoe? Yes NO
		-0	Type: Clayton Mark Dia.: 11*
Sand	92	92	Slov/Gauze 80 Length
Red Clay & Sand	26	118	Set between 154 ft. and 158 ft.
		146	Fittings: Brezer & K-packer
Blue Clay	28	140-	9 STATIC WATER LEVEL
Rlue Clay with Sand Strips	<u> 1</u> 2	150	ft. below land surface
			10 PUMPING LEVEL below land surface
.nd with Blue Clay Chips	4	154	103 ft. after 1 hrs. pumping 10 g.p.m.
Sand	L	7 58	ft. after hrs. pumping g.p.m.
			11 WATER QUALITY in Parts Per Million:
		 	Iron (Fe) Chlorides (C1)
	1		HardnessOther
			12 WELL HEAD COMPLETION: The Approved Pit
			Pitless Adepter 12" Above Grade
			13 Well Grouted? Yes X No Neat Cement Bentonite
	+		─
		<u> </u>	Depth: Fromft. toft. 14 Nearest Source of possible contamination
			Well disinfected upon completion Yes No
	+		15 PUMP: Not installed
		<u> </u>	Manufacturer's Name Flint & Walling
			Model Number <u>C6269-H</u> HP 1 Volts 230
	 	 	Length of Drop Pipe 126ft. capacity 5 G.P.M. Type: Submersible
•			✓ Jet Reciprocating
]
USE A 2ND SHEET IF NEEDED	<u> </u>	17 WATER	WELL CONTRACTOR'S CERTIFICATION:
16 Remarks, elevation, source of data, etc.		This w	all was drilled under my jurisdiction and this report is true
		1	pest of my knowledge and belief. 67-1297 FEREO BUSINESS AME 111 PS REGISTRATION NO.
<u> </u>]	
			s 19985 Hoover Ed., Big Rapids, MI
ì		Sinned	Thomas De Derul Date 2-22-86
			AUTHORIZED REPRESENTATIVE

CEDI DOICAL CURVEY NO			PUBLIC HL TH
	WELL A	NIO PU	MP RECORD PERMIT NUMBER
1 LOCATION OF WELL County Township Name **LETESEY		Fraction NE 1/45	SE 1/4 NE 1/4 27 Town Number Range Number
JUMILE SOUTH OF HERSEY RUISE WEST SIDE OF 1404	s. ON	140#	MARTIN DAILEY
THINKE SOUTH OF HERE!	que:		Address 1404 AUE
14			NET2SEY
Street Address & City of Well Location Lecate with X in Section Below Sk	etch Map:		Address Same As Well Location? Yes No 4 WELL DEPTH: Date Completed New Well
ILERSEY 65			WELL DEPTH: Date Completed ST. Date Completed New Well Replecement Well
	4		5 Cable tool Rotary Driven Dug
*	4	- 4	6 USE: Demestic Type I Public Type III Public
	Ž		☐ Irrigation ☐ Type IIa Public ☐ Heat pump ☐ Test Well ☐ Type IIb Public ☐
	in the State of th		7 CASING: Steel Threeded Haight: Above/Below
MILE	THICKNESS	DEPTH TO	2 Plastic Welded Surface ft.
2 FORMATION DESCRIPTION	OF STRATUM	BOTTOM OF STRATUM	in, to 55 ft. depth
		38	in. toft. depth Drive Side Tes
TAND C			B SCREEN: Not Installed
COARBE COMPUEL	38	40	Type 2455 Diameter 114
Snum	40	70	869/Gauze # 90 Length #90
O O I			Set batwaenft. andft. FITTINGS: R-Packer Lead Packer Joremer Check
KED CLAY	70	71	Blank above screen ft. Dthar 9 STATIC WATER LEVEL:
CLAVYSAND	71	87	ft. below land surface
	87	95	10 PUMPING LEVEL: below lend surface
LINE JANI)	8/	75	ft after hrs. pumping at G.P.M.
	- 2		11 WELL HEAD Titless adepter 12° above grade CDMPLETION: Basement offset Approved pit
	 		12 WELL GROUTED? No Yas From to
	 		Neat cement Bentonite Other
			Ne. of bags of cementAdditives
e de la companya de			13 Nearast source of possible contamination 14 Direction 40
		 	Well disinfected upon completion?
	<u> </u>		Wea old well plugged? Yes No
		ī	14 PUMP: Not Installed Pump Installation Only Manufecturer's name
· ·			Model number 107 HP 34 Volts 110
	 		Length of Drop Pipeft. capacity G.P
			TYPE: Submersible Jet PRESSURE TANK:
		-	Manufacturer's name/U/T
use a 2ND sheet if NEEDED 15. Remarks, elevation, source of data, etc.			Model number Capacity Gall ER WELL CONTRACTOR'S CERTIFICATION:
			rell was drilled under my jurisdiction and this report is true pest of my knowledge and belief.
* 1호텔 		1 till	tuon alee & rulling 1801
17. Rig Dperator's Name:	· · · · · · · · · · · · · · · · · · ·	Addres	REGISTRATION NO. REGISTRATION NO.
		Signed	Gentale Co Sterior Date 9-14-84

D67d 12/B5 Page 67

Authority: Completion: Penalty:

Act 368 PA 1978
Required
Conviction of a violation
of any provision is a
misdemeanor.

OFOLOGICAL CURVEY NO	NELL A	ND PU	MP RECLID W89670002 PERMIT NUMBER
1 LOCATION OF WELL	<u> 6</u> 7	1709	26004 PERMIT NUMBER V
7 Sceola Township Name Hersey		Frection SE 1/4 A	VE 1/45W 1/4 26 17 N/8 9 K/W
Grant So of 2 mu Ro \$ 135			3 OWNER OF WELL: Kalium Chemicals
15 ON Wests ide of 135th		'	Address P.O. BOX 333 11/26 So. 140 & 14: 49639
Street Address & City of Well Location			Address Seme As Well Location? Yes No
Locate with X in Section Below	etch Map:	. 01	4 WELL DEPTH: (completed) Date of Completion 3/7 ft.
	T. M.	<u>i</u> <u>E</u>	5 Cable toel Rotery Driven Dug Hollow rod Auger Jetted
			6 USE: Domestic Type I Public Type III Public Haet pump
MI. 12	135 th		7 CASING: Staal Threaded Height: Above/Below
140th		00074 70	Plestic Welded Surface 2 ft.
2 FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM	in. toft. depthlbs./ft.
Gray Clay	60	60	Grouted Dritt Hole Diameter 7 in. to 300 ft. depth in. toft. depth No
Sand	82	142	8 SCREEN: Not Installed Type Johnson S. S. Diarneter 3
Grav Clav	42	195	Slot/Gauze 10 Length 15' Set between 302 ft. end 3/7 ft.
Sd & Clay mixed	25	220	FITTINGS: X K-Packer Leed Packer Bramer Check Blank ebove screen ft. Other
C. C.	22		9 STATIC WATER LEVEL:
Gray Lilay	70	260	10 PUMPING LEVEL: below lend surface Flow
Jd & Clay Mixed	30	290	ft. after hrs. pumping at G.P.Mft. after hrs. pumping at G.P.M.
Med to Coarse Sd	27	3/7	11 WELL HEAD Pitless adapter 12° above grade
			Basement offset Approved pit 12 WELL GROUTED? No X Yes From 0 to 300 ft.
			Neat cement Bentonite Other
			No. of bags of cernent 26 Additives
PLANSITE POTABLE WATER WELL			13 Nearest source of possible contamination Type Septic Distance 85 ft. Direction West
WATER WELL			Well disinfected upon completion? Yes No
·			14 PUMP: Not installed Pump Installation Only Manufacturer's name Flint Well, 45
			Manufacturer's name F/1 N + 1 Wall, 75 Model number FF 55 HP 5 Volts 230 Length of Drop Pipe 277 ft. capacity 35 G.P.M.
			TYPE: Submersible
			PRESSURE TANK: Menufacturer's nama
USE A 2ND SHEET IF NEEDED	<u> </u>	40 1411	Model number Capacity Gallons
15. Remarks, elevation, source of data, etc.		This we	R WELL CONTRACTOR'S CERTIFICATION: ell wes driffed under my jurisdiction and this report is true best of my knewledge and belief.
		1	REGISTERED BUSINESS NAME REGISTRATION NO.
		Addres	
D67d 2/84		Signed	AUTHORIZED REPRESENTATIVE Oete 4- 12-89

GEOLDGICAL SURVEY NO. WATER	R WELL A	ND PÜ	MP RECORD PERMIT NUMBER
1 LOCATION OF WELL	لحم أبر سيأ أربا	The state of the s	
OSCROTA Township Name: Hersey		Praction /	UULSEN 23 17NIS 9
stance And Direction From Road Intersection		***************************************	Address 2381 W. Hersey Rd.
KIMI E OF 135" ON HUSE WIST Side of Rd.	y RU.		Address 238 W. Hersey Pd.
그 선생님들은 이 아름아보다는 그 얼마를 하는데 살았다.	3. 18 3.6 F		HUSCY MILL STORE OF STORE
Street Address & City of Well Location	Sketch Map:	10 M	Address Same As Well Lecation? Yes No 4 WELL DEPTH: Date Completed New Well
			3/FT. 6 3 9/ Replacement Well
		ALC: NO.	5 Cable too! Rotary Driven Phollow rod Auger Maletted
X		A SECOND	6 USE: ADamostic Type I Public Type II Public
			Irrigation Type Ila Public Heat pump
	·		7 CASING: Staal Threaded Height: Above/Below:
1 MILE		225 1 5	Plastic Welded Surface 1
2 FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO SOTTOM OF STRATUM	in. to 31 ft. depth Weight 32 lbs 4t.
			Grouted Drill Hole Diameter in, toft, depth Drive Shoe A fee
SAUD			in. toft. depth NG
Clav	20	27	Type Diameter
	/	31	Slet/Gaure 80 Langth 4
			Set batween 77 ft. and 7/ ft.
			Slank above screen 2 ft. Other 9 STATIC WATER LEVEL: 4:
			7 - It. belew land surface
		1 28	10 PUMPING LEVEL: bolow land surface
	6478	Control of the second	ft. after hrs. pumping at G.P.M ft. after hrs. pumping at G.P.M.
The second secon			
		-	11 WELL HEAD CDMPLETION: Basement offset Approved pit
		-	12 WELL GROUTED? No X Yes From to
			□ Neat cement □ Bentonite □ Dther
[[: 41]	, · · · · _		No. of bags of cement Additives
			13 Nearest source of possible contamination
			Type Distance SO It Direction Well disinfected upan completion? X Yes No
			Was old well plugged? Yes No
	·		14 PUMP: Not Installad Pump Installation On
			Model number CPSCS HP 1/2 Voits 1/
	·		Length of Drop Pipe
			TYPE: Submersible X Jet PRESSURE TANK:
			Manufacturer's name CAN-AIRS
USE A 2ND SHEET IF NEEDE 3		1 -	R WELL CONTRACTOR'S CERTIFICATION:
	1		ell was drilled under my jurisdiction and this report is true best of my knowledge and belief.
			S! Swater wells 1747
17. Rig Operator's Name:		Addres	REGISTERED BUSINESS NAME REGISTRATION NO. REGISTRATION NO. REGISTRATION NO.
			Street Sounday Date 6/3

D67d 2/89 Page 69

Authority: Cempletion: Penalty: Act 368 PA 1978
Required
Conviction at a violation
of any pravision is a



LOG OF OIL, GAS, DISPOSAL OR STORAGE WELL (ACT 61)

	00
Sane	LANGE L

36600

	•		Submit	in DUPLICA	TE Within 3	O Days after	Well Comple	tion		DE	EPE	NING F	PERMI	TNUA	ABER			
N.	ANEIS) &	ADDR	ESS O	F OWNERIS	SHOWN	NPERMIT		NAME & A	OD	RESS OF	DRIL	LING	CONTI	RACTO	PISI			
	PPG Oi	1 &	Gas	Co., In	.c.			T. D.	P	rovins	Dr	illir	ng C	ompa	ny			
				se Drive				2113	En	terpris	se l	rive	3					
			-	MI 488				Mt. F	le	asant,	MI	488	358					
LE				LNUMBER		PERMIT								ECTIO	NALL	Y DRI	LLED	
	Thomas												YES		NO	TT.		
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	NE NW					26	1	7N		(9W			Her	sev			
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			n]	North L	ine and 8	364		West L	ine	of quarter :	sectio	n			eola			••
SU	BSURFA		-		SECTION		TOWNSHI			RANGE			TON	NSHIE				
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FC	OTAGES		(Nor	th/South)			(E	ast/West)					COU	NTYP	AME			
		Fr. from	m	L	ine and		Ft. from_	1	Line	of quarter	secti	on						
	DRILLIN	G BEG	UN		TOTAL DI	EPTH OF WE	LL	TYPE WE	LL				1					
D	3-	12-8	3		Driller_80	185_ Log_	8091	Temp) .	Abandon	ned			2	LEVA	TION	S	
	DRILLIN	G COM	APLET	TED	FORMATI	ON AT T.D.		FT. DRLD). –	ROTARY	TOO	LS	K.B.			A.F.		
A	(1-	06-8	4		Cabo	t Head		From	0	To	809			1137	.2	11	135.8	8
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	FORMA	TION	lo	IL OR GAS	FROM	TO	1			OIL T				WHER	E OBS	ERVE	D (X)	
	None						FORM	NOITA	0	RGAS	DE	PTH	Sam- ples	Odor	Pits	Mud	Gas Log.	Fall
							Antrin	1	G	as	30.	50					XX	
							Trav.		G	as	35	96		1			XX	-
							Burnt		G	as	79	82					XX	
-													1	-				
		STIM	ULAT	ION BY ACI	DORFRA	CTURING		WAT	ER	FILL UP	F.U.	OR L	OST C	IRCUL	OITA	N (L.C	(X) (.:	
	DATE	Int	erval	Treated	Materia	is and amoun	t used	FORM	TAN	ION	F.U.	L.C.	DEP	TH		AMO	UNT	
		No	ne					Nor	ne									
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			-					11		/								
		MECH	ANIC	AL LOGS, L	IST EACH	TYPE RUN		DEPTH C	ORF	RECTION	DE	MATIC	N SU	RVEY	PL	UGGE	D BAC	:K
	Brand		(x)	LOGI	YPES	LOGGEDI	TERVALS	DEPTH	C	ORRECTN	RU	NAT	DEG	REES	YES	INC	DE	PTH
Sci	Jumberge			LDT-CNL		-	- 8091		1		15		3/			1	-	
_	dwell		1	Sonic	. 010		- 8091		1		37			4°		1		
				DLL-MLI			- 5405		1		50			40				
D'A'							- 8076				78		212					
MI						1 0 ,20		U										
						PF	ODUCTION	TEST DA	TA									
0	IL - Bbls	day	GHAV	ITY - OAP	COND.	Bbls/day G	AS - MCF/c	TAY WATE	R -	Bbis/day	H ₂ S -	- Grain	s/100	cu. ft.	8.H.	P. AN	D DEP	TH
					1													-

I AM RESPONSIBLE FOR THIS REPORT. THE INFORMATION IS COMPLETE AND CORRECT. DATE 2/15/84 NAME AND TITLE (PRINT)
William E. Booker, Geologist

GEO ICAL SURVEY DIVISION

WELL PLUGGING RECORD

(Submit in TRIPLICATE Within 30 Days After Plugging is Completed)

PERMIT NUMBER

36600

FIELD NAME

	· · · · · · · · · · · · · · · · · ·			•		FIELD	NAME	10000
		SS OF WELL DWNE			V. 753			
PPG Oil	L & Gas Co. Se or farm nat	Inc., 2258 F	<u>Interprise Dr</u>	rive	, Mt. Pleas	sant, M.	1 48858	WELLNUMBER
Thomas	COR PARM NA	VIE(3)						1-36 1-26
WELL LOCATION	<u> </u>					TOWNSH	412	COUNTY
NE ¼	NW ¼	NW 1/4 SEC. 26	T. 17N		R. 9W	Hers		Osceola
	Oil, Gas, Dry Hole				TAL DEPTH	FORMAT		
Tempora	erily Abando	oned			8091	Cal	oot Head	
DATE PLUGGING 1-7-84	STARTED	DATE PLUGGING	COMPLETED		PT. REPRESENTA IGGING	TIVE(S) W		MIT OR WITNESSED
				· ·				
	· - ·- ··	G RECORO		┨╴┡			RIDGES DR PLU	
SIZE CASING	OEPTH SET	AMOUNT RECOVERED	SHOT OR RIPPED		TYPE (Brush, S Cement, Mechanic		OEPTH PLACEO	SACKS OF CEM
20"	68			↓ -	Cement		8085	200 sx Cl A
13 3/8"	898			! -	Baker Bridg	ge Plug	5365	
9 5/8"	5417							
				┨╟				-
		-		{ ├		1		
	:	1		, _	, , , , , , , , , , , , , , , , , , ,			
pot cement, or Vas the well plu	set bridge plugs: gged by a Comp r than Owner or	eny or	YES DAY		<u>Hall</u>	liburto	d address: n d address:	
	of Owner, Opera	ator, Company, or C	Contractor who wi	itness	ed <u>Carl (</u>	Cooking	nam	
olugging:		-						
ESCEIGE IN OF	TAIL HOW WELL	WAS BUILDED						
		to 8085 and s	spotted 200 s	sx (lass A. tri	ipped or	ut and ran	back in with
Baker b	oridge plug	to 5365 - set	bridge plug	g, t	ripped out	and we	lded steel	plate on
	[emporarily							
······································								
	T. S. Maria					·· · · · · · · · · · · · · · · · · ·		
			-		<u></u>			
							(USE REVE	ASE SIDE IF NEEDED!
	· · · · · ·							
'I state that I ar	n authorized by	said Owner or Oper	CERTII	repor	rt; and that this i	report was	prepared unde	r my supervision and
	e facts stated he	rein are true, correc	t and complete to	the			NAME AND ADD	NO. C.C.
	E Cryped or Printe E. Booker				i			al Services, In
WILLIAN GNATURE ,	L. BOOKET	, GEOTORISE	DATE	(Mon	th. Day. Year) 14		-	DELVICES, II
7-11	. —	0 %	ſ					4 8 858

STATE OF MICHIGAN
IEPARTMENT OF NATURAL RESOURCES
GEOLOGICAL SURVEY DIVISION

MINERAL WELL COMPLETION REPORT TO BE FILED WITH THE SUPERVISOR WITHIN 60 DAYS AFTER COMPLETION OF WELL (ACT 315, P.A. 1969)

SUBMIT IN TRIPLICATE

NAME OF	OWNER O	R OF	ERATO	R					ADDRE	SS	OF OWNER	OR OPERA	TOR				
PPG	0il & (Gas	Co.,	In	c.				225	8	Enterpris	se Drive	2				-
			,	~	••						leasant,						İ
NAME OF	DRILLING	CON	VTRAC	FOR					ADDRE	SS	DF DRILLIN	G CONTR	ACTOR				
T. D	. Prov	ins	Dril	lin	g Co.				211	3	Enterpris	se Drive	2				!
					.						leasant,						
WELL NAM	<u> </u>								L								
WELL NAM		Thor	กลร						WELL N			PERMIT I	чимве -841-			**	
LOCATION									SECTIO			TWP.	041	-507	RANGE		
Surf	ace: Ni	E N	WN W	Sub	surface:	SW	NW N	īW		26		<u> </u>	L7N			9	W
TOWNSHIP									CDUNT	Y					·		
Hers	ey										Osceo]	La					
FODTAGE	460		Ft.	from	No	rth		Line and _	864		Ft. from		est or W	L	ine of qua	rter	section
DATE DRIL		MEN	ICED		DATE DRIL			LETED			L COMPLET			PEOF			
1	-29-84					4-84					15-84	,			Cest D	& .	A
FORMATION Niag		STED	IN		TOTAL DEP	тн 840	nα		ELEVATIO	INC	кв 1138	RB	RT		RF 1137		GN 1121
ROTARY TO	.					041	0 9		CABLE	<u></u>			<u> </u>		113/		1141
From	0		F	eet t	ta 8	388		Feet	From		ULS	_	eet to				Fect
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			· ·					ELL CASI		RD)						
	LB./FT.	<u> </u>						T	NG DATA					1	OR OPEN	HE	
20"	<u> </u>		GRADE		68 E	SAC D.		TYPE	SIAGIN		DEPTH(S)	ND. HD	LES	<u> </u>	ROM		
13 3/8		1	K-55		896		00		ļ <u>-</u>								
9 5/8			N-80		5417	17	00		1					i			
	,							L	<u> </u>					<u> </u>		<u></u>	
	w	ATE	R ZO	NES							WIRE LIN	IE LOGS	RUN				
FORMA	TION	FRO	ом	то	AMOU	NT '	/ I	ERVICE CO			TYPE LOG		NTER	VAL LD	GGED] (OPY TO SURVEY
	(Fresh)				<u> </u>		Sch	lumberge	er		LDT-CNL-(3R	543	- 83	85	1_	Yes
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FRA	CTURE	O R	ACID	TRE	ATMENT	·					SOLUTI	ON MINI	NG				
DATE		FRO		TO	QUANT	ITY		NAME AND	NUMBER	DF	INJECTION			VEL! -	DISTANC	E A	PART
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					The informa	ation ir	n and	attached to	this report	ís (complete and	correct.					•
SIGNATUR	E //				0	1		TITLE							DATE		
1.	-//-		5	==== ,	15. IL	7		}	B - 19		Geologist	-			5/2	29/	84
w.	M		<u></u>	//	1 worth			1									
					GIVE C	OMPLE	ETE F	MO'TAMRO	PECCAD	οN	REVERSE S	IDE.					

DEPARTMENT OF NATURAL RESOURCES GEOLD TCAL SURVEY DIVISION MINERAL \ LL PLUGGING RECORD File in DUPLICATE Within 30 Days After Plugging is Completed

PERMIT NUMBER
020-841-367
DATE

OWNER OR DPERATOR PPG 0il & Gas Co., Inc. ADDRESS 2258 Enterprise Drive, Mt. Pleasant, MI 48858 WELL NAME Thomas WELL LOCATION NE ¼ NW ¼ NW ¼ SEC. 26 T. 17N R. 9W Hersey TYPE OF WELL (Brine, Oisposal, Storage, or Test) Test DATE PLUGGING STARTED 5-15-84 NAME OF DEPARTMENT REPRESENTATIVE WHO AUTHORIZED OR SUPERVISED PLUGGING SIZE WHERE SET AMOUNT RECOVERED RIPPED CASING SIZE WHERE SET AMOUNT RECOVERED RIPPED CEMENT CEMENT DESCRIBE IN DETAIL HOW WELL WAS PLUGGED	DEPTH PLACED 8409-8230 8230-5915	a NC
PPG 0il & Gas Co., Inc. ADDRESS 2258 Enterprise Drive, Mt. Pleasant, MI 48858 WELL NAME Thomas WELL COATION NE W NW W NW W SEC. 26 T. 17N R. 9W Hersey TYPE OF WELL (Brine, Oispasal, Storage, or Test) Test DATE PLUGGING STARTED 5-15-84 NAME OF DEPARTMENT REPRESENTATIVE WHO AUTHORIZED OR SUPERVISED PLUGGING Snider CASING SIZE WHERE SET RECOVEREO RIPPED TYPE OF BRIOGES OR PLUGS CAMENT RECOVEREO RIPPED CEMENT	Osceola DESOURCES XX YES DEPTH PLACED 8409-8230 8230-5915	
ADDRESS 2258 Enterprise Drive, Mt. Pleasant, MI 48858 WELL NAME Thomas WELL COATION NE 1/4 NW 1/4 NW 1/4 SEC. 26 T. 17N R. 9W Hersey TYPE OF WELL (Brine, Oisposal, Storage, or Test) Test DATE PLUGGING STARTED 5-15-84 NAME OF DEPARTMENT REPRESENTATIVE WHO AUTHORIZED OR SUPERVISED PLUGGING STIZE WHERE SET 20" 68 Cement 13 3/8 896 Cement 9 5/8 5417 Cement Cement Kick plug	Osceola DESOURCES XX YES DEPTH PLACED 8409-8230 8230-5915	
2258 Enterprise Drive, Mt. Pleasant, MI 48858 WELL NAME Thomas WELL LOCATION NE 1/4 NW 1/4 NW 1/4 SEC. 26 T. 17N R. 9W Hersey TYPE OF WELL (Brine, Oisposal, Storage, or Test) Test DATE PLUGGING STARTED 5-15-84 NAME OF DEPARTMENT REPRESENTATIVE WHO AUTHORIZED OR SUPERVISED PLUGGING Snider CASING SIZE WHERE SET AMOUNT RECOVERED RECO	Osceola DESOURCES XX YES DEPTH PLACED 8409-8230 8230-5915	
WELL NAME Thomas WELL LOCATION WELL LOCATION NE 1/4 NW 1/4 NW 1/4 SEC. 26 T. 17N R. 9W Hersey TYPE OF WELL (Brine, Disposal, Storage, or Test) Test DATE PLUGGING STARTED 5-15-84 NAME OF DEPARTMENT REPRESENTATIVE WHO AUTHORIZED OR SUPERVISED PLUGGING Snider CASING SIZE WHERE SET RECOVEREO RIPPED CAMBOLIT AMOUNT RECOVEREO RIPPED CEMENT 13 3/8 896 CEMENT CEMEN	Osceola DESOURCES XX YES DEPTH PLACED 8409-8230 8230-5915	
WELL LOCATION NE 1/4 NW 1/4 NW 1/4 SEC. 26 T. 17N R. 9W Hersey TYPE OF WELL (Brine, Oisposal, Storage, or Test) Test DATE PLUGGING STARTED 5-15-84 NAME OF DEPARTMENT REPRESENTATIVE WHO AUTHORIZED OR SUPERVISED PLUGGING Size WHERE SET 201' 68	Osceola DESOURCES XX YES DEPTH PLACED 8409-8230 8230-5915	
NE % NW % NW % SEC. 26 T. 17N R. 9W Hersey TYPE OF WELL (Brine, Oispass), Storage, or Test) Test DATE PLUGGING STARTED 5-15-84 NAME OF DEPARTMENT REPRESENTATIVE WHO AUTHORIZED OR SUPERVISED PLUGGING Snider CASING SIZE WHERE SET RECOVERED RIPPED ROMANDIA RECOVERED RIPPED ROMANDIA RECOVERED RIPPED ROMANDIA RECOVERED ROMANDIA RECOVERED ROMANDIA RECOVERED ROMANDIA RECOVERED ROMANDIA ROM	Osceola DESOURCES XX YES DEPTH PLACED 8409-8230 8230-5915	
TYPE OF WELL (Brine, Oisposal, Storage, or Test) Test DATE PLUGGING STARTED 5-15-84 NAME OF DEPARTMENT REPRESENTATIVE WHO AUTHORIZED OR SUPERVISED PLUGGING Snider CASING SIZE WHERE SET 2011 68 13 3/8 896 9 5/8 5417 Cement Ceme	DEPTH PLACED 8409-8230 8230-5915	
Test Date Plugging Started 5-15-84 Name of Department representative who authorized on supervised plugging Snider Casing Size Where set Recovered Ripped 20" 68 Cement 13 3/8 896 Cement 9 5/8 5417 Cement kick plug	DEPTH PLACED 8409-8230 8230-5915	□ NC
DATE PLUGGING STARTED 5-15-84 NAME OF DEPARTMENT REPRESENTATIVE WHO AUTHORIZED OR SUPERVISED PLUGGING Snider CASING SIZE 20" 68 13 3/8 896 9 5/8 5417 CASING 9 5/8 5417 CASING CEMENT CEMENT	DEPTH PLACED 8409-8230 8230-5915	□ NC
S-15-84 NAME OF DEPARTMENT REPRESENTATIVE WHO AUTHORIZED ON SUPERVISED PLUGGING Snider CASING SIZE WHERE SET RECOVEREO RIPPED Cement 13 3/8 896 9 5/8 5417 Cement kick plug	DEPTH PLACED 8409-8230 8230-5915	□ NC
S-13-84 S-15-84 S-15-84 S-15-84 S-15-84 Snider Snider Snider Snider Snider Snider Snider Snider Snider Shot or recovered Size Siz	DEPTH PLACED 8409-8230 8230-5915	□ NC
CASING WHERE SET AMOUNT SHOT OR TYPE OF BRIOGES OR PLUGS	PLACED 8409-8230 8230-5915	
CASING SIZE WHERE SET AMOUNT RECOVERED RIPPED TYPE OF BRIOGES OR PLUGS	PLACED 8409-8230 8230-5915	
SIZE WHERESET RECOVEREO RIPPED	PLACED 8409-8230 8230-5915	
SIZE WHERESET RECOVEREO RIPPED	PLACED 8409-8230 8230-5915	
SIZE	8409-8230 8230-5915	NUME
13 3/8 896 Cement 9 5/8 5417 Cement kick plug	8230-5915	SAC
9 5/8 5417 Cement kick plug		
		52
DESCRIBE IN DETAIL HOW WELL WAS PLUGGED	5915	25
DESCRIBE IN DETAIL HOWWELL WAS PLUGGED		
DESCRIBE IN DETAIL HOW WELL WAS PLUGGED	_ [
DESCRIBE IN DETAIL HOW WELL WAS PLUGGED		
		
Ran drill pipe to 8409 and spotted 50 sx and pulled up to 8230 and spot	ited 324 SX,	
pulled up to 5915 and spotted 250 sx, kick off plug.		
		····
(USE	E REVERSE SIDE II	FNEE
Were tools, tubing, casing, etc., lost or left If yes, give details:		
in the hole before or during plugging? YES XX NO		
Did a Service Company pump mud, If yes, give name and address:		
spot cement, or set bridge plugs? YES NO Halliburton		
Was the well plugged by a Company or If yes, give name and address:		
Contractor other than Owner or Operator? YES XX NO		
Representatives of Owner, Operator, Company, or Contractor who witnessed plugging		
Marvin Woods		
CERTIFICATE		
/ William E. Booker of Strickler Geological Services, I	Inc.	mpany
state that I am authorized by said Owner or Operator to make this report; and that this report was prepared under my	v supervision and	direc
and that the facts stated herein are true, correct and complete to the best of my knowledge.	, ,	
SIGNATURE / ADDRESS TITLE		
William S Burn 1425 S. Mission, Mt. Pleasant, MI Geolog	gist	
FINAL INSPECTIONS		
DEPARTMENT REPRESENTATIVE	OATE	
DEPARTMENT REPRESENTATIVE		<u>,</u>
B - 20	DATE	
	DATE	

TATE OF MICHIGAN DEPARTMENT OF NATURAL RESOURCES GEOLOGICAL SURVEY DIVISION

MINERAL WELL COMPLETION REPORT TO BE FILED WITH THE SUPERVISOR WITHIN 60 DAYS AFTER COMPLETION OF WELL (ACT 315, P.A. 1969)

SUBMIT IN TRIPLICATE

NAME OF	OWNER OF	OPERA	TOR					ADDRE	SS OF OWNER	OR OPERA	TOR				
								225	8 Enterpris	e Drive					
PPG	0il & G	as Co.	, I	nc.					Pleasant,		8				
NAME OF	DRILLING	CONTRA	CTOP	7				ADORE	SS OF DRILLIN	G CONTRA	стоя	1			
T. D	. Provi	ns Dri	.llir	ng Co.					3 Enterpris Pleasant,		8				
WELL NAM	Ë)	NUMBER	PERMIT N	UMBE	R			 .
Thom					,				26B		-841	-367		·	
LOCATION				ection_23	}			SECTIO		TWP.	7 N.		RANGE	9W	
TOWNSHIP		<u> </u>	1 300	ection 25	}			COUNT			-1-				 ,
Hers FDOTAGE	ey 460					_		<u> </u>	0sce01a						
			Ft. fro	N o			Line and _			Ε̈́σ	r W		ne of qua	rter	section
ł	15-84				4-84				WELL COMPLET 5-16-84	Eo	TÝF	Test	ELL t - D	& A	•
FORMATIO Niag		TEO IN		TOTAL DEF			37 <i>6</i>	ELEVATI	ON KB 1138	RB	RT		BF 1137		GN 1121
HOTARY T				10770 1m2	, 0, 4		<u>. </u>	CABLE	TOOLS	L	L				<u> </u>
From	0		Feet	t to	8356		Feet	Fron	n	Fe	et to				Feet
·					 -	W	ELL CASIN	VG RECO	ORD						·
	UBING AN			T			CEMENTI	T				1	OR DPE	V HO	
\$1ZE 20"	LS./FT.	GRA	DE	DEPTH 68	SACI D.		TYPE	SIAGIN	VG DEPTH(S)	NO HOL	E5	FR	IOM		<u>TO</u>
13 3/8"		K-5	5	896	70										
9 5/8"		N-8		5417	170			_							
													•		
	<u> </u>				<u> </u>			<u></u>		<u> </u>		<u> </u>		<u></u>	
		ATER Z								E LOGS F				1 c	OFY TO
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FRA	ACTURE	OR ACI	D TR	EATMENT					SOLUTI	ON MININ	IG		· · · · · · · · · · · · · · · · · · ·		
DATE	<u> </u>	FROM	TO	QUANT	ITY		NAME AND	NUMBER	OF INJECTION			VELL - 1	DISTANC	EΑ	PART
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	= +														
·										<u> </u>					
			<u> </u>					·			<u> </u>				
	·			The inform	ation in	and	attached to	this report	is complete and	correct.					<u>.</u>
SIGNATUR	E //.		صر	0	1		TITLE	C- 1.	·	. —			OATE	ว ก /	R./.
N)	Men		<u>-</u>	Book			B-21	Geolog	gı s t				6/ ———	29/	

STATE OF MICHIGAN DEPARTM DE NATURAL RESDURCES GEOLDGICAL SURVEY DIVISION

MINERAL WELL PLUGGING RECORD

File in DUPLICATE Within 30 Days After Plugging is Completed

PERMIT NUMBER
021-841-367
DATE

						DATE			
						6/29	/84		
OWNER OR OF	ERATOR					<u> </u>			
PPG Oil	& Gas Co.,	Inc.							
ADDRESS				<u> </u>			· · · · · · · · · · · · · · · · · · ·		
2258 En	terprise Dri	ve, Mt. Plea	sant, MI 4	48858					
WELL NAME				, 		WELL NUMBER			
Thomas						1-26B			
WELL LOCATI	ON					TOWNSHIP		COUNTY	
NE 1/4	NW 1/4	NW 1/4 SEC	. 26 T	. 17N	R. 9W	Hersey	ļ	0sceol	a
TYPE OF WELL	L (Brine, Oisposal, S	torage, or Test)			TOTAL DEPT	H FORMATION			
Test					8376	Niagara			
DATE PLUGG!	NG STARTED	DATE PLUGO	ING COMPLET	ED	WAS PERMISS	ION OF DEPT, OF NATUR	AL RESO	URCES	
5-26-84			6-84				v r	XXXIYES	<u> </u>
NAME OF DEP	ARTMENT REPRE	SENTATIVE WHD	AUTHORIZED O	RSUPER	IVISED PLUGGI	NG			
Snider		·	· · · · · · · · · · · · · · · · · · ·					··-	
CASING	WHERESET	AMOUNT	SHOT DR	1	TYPE DE	BRIDGES OR PLUGS	1	DEPTH	NUME
SIZE		RECOVERED	AIPPED					PLACEO	SAC
20"	68			Cem	ent	·		8376	10
13 3/8"	896		!	Cem	ent			8000	8.
9 5/8	5417		<u> </u>	Cem				<u>5450</u>	26
				Cem	ent			4700	39
· · · · · · · · · · · · · · · · · · ·			<u> </u>	Cem	ent			1400	10
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l .	bing, casing, etc., fore or during plu		☐ YI	ES K	If y	es, give details:			
	Company pump nor set bridge plugs		₩ YI	ES Γ	Ify	es, give name and addres Halliburton	 ss:		
	- 5								
	olugged by a Comp her than Owner o		□ Y	es 🖟	X NO	es, give name and addres	<u> </u>		
Representatives	of Owner Dosestor	, Company, or Contr	actor who witnes	sed bluce	ing				······································
	rvin Woods	, = 5p= ; , o			J				
				CERT	FICATE				
į Wi	lliam E. Bor	ker				eological Servic	es. In	z. ,	company
state that I am	authorized by sa			nis repor	t; and that this	report was prepared und			
SIGNATURE	llian E	Book			n, Mt. Ple	TITLE G	eologis	st	
Jacob Barrer	7		F1	NAL IN	SPECTIONS				
DEFARTMENT	REPRESENTATIV	E					}	DATE	
DEPARTMENT	REPRESENTATIV	E	* , , , , , , , , , , , , , , , , , , ,	B - 2	2			DATE	

DEPARTMENT OF NATURAL RESOURCES

LOG OF OIL, GAS, DISPOSAL OR STORAGE WELL (ACT 61)

Submit in DUPLICATE Within 30 Days after Well Completion

DEEPENING PERMIT NUMBER

NAME(5) & A					NPERMIT			DORESS OF				RACTE	R(S)			
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lt .		-	rise Dri					s. missi leasant,		488	58					
1			t, MI 48				rit. r	TCGSGHE,	***	-00-						
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SURFACE LO	CATI	ON		SECTION		TOWNSHIP	1	RANGE			TOV	WNSHIP		E		
NW 1	NE S	W		26	5	171	N	9	W				sey			!
FOOTAGES					//7		st/West)		———		COL	A YTMU	_			
			rth Li		667			ine of quarter	sectio	on	1		eola			•
SUBSURFAC	<u>:E</u> LO(LATID	N	SECTION		TOWNSHIP	•	RANGE			1.0	WNSHIE	NAM	=		
FODTAGES							sst/West)				COL	NTY	IAME			
ł						Ft. from			r secti	ion						
DRILLING							TYPEWE	ry Hole				_		T.10	_	
	0-11			Driller Ö.		8140	FT 5015	ROTARY	TA 0		К.В		LEVA	TION:	-	
A DRILLING	3-31		ED	_	t Head			0 To_				1191			190	. 3
E WELL CO	MPLE	TED		PRODUCIN	IG FORMA	ATION(S)	FT. DRLD	CABLE T	OOLS	5	R.T			Grd.		
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	CASIN	IG, CA	SING LINER	RS AND CE	MENTING				P	ERFO	RATI	ONS				
SIZE	ν	VHER	E SET	СЕМЕ	NT ·	Ft. Pulled		NUMBER	٦	INTER		PERFO			QP	EN
20"		7	7	D.P		·	DATE	HDLES		INIEH	VAL	PERFO	KATEL		YES	NO
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						Reed Ci	ty Dol	Gas		100	-	1			X	
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<u> </u>						A2 Carb	onate	Gas	1 6	995	<u> </u>		X		X	l
	STIM	ULAT	ION BY ACI	OR FRAC	TURING		WAT	ER FILL UP	(F.U.	JORL	OST (CIRCUL	ATIO	V (L.C	.) (X)	
DATE	Int	erval 1	Treated	Materia!	s and amou	int used	FORM	MOITAN	F.U.	L.C.	DEI	PTH		AMO	UNT	
		None	2		··		None							-		
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	месн	ANIC	AL LOGS, LI	ST EACH 1	YPE RUN	I	DEPTH C	ORRECTION	DE	VIATIO	ON SL	JRVEY	PLL	JGGE	DBA	CK
Brand		(x)	LOGT	YPES	LOGGED	INTERVALS	DEPTH	CORRECTA		TA NL	DE	GREES	YES	NO	DE	PTH
Schlumberger		X	LDT-CN	L-GR	200-	-8135	[<u> </u>	_	450	1	1°	ļ		4	
Birdwell			Dual M	icro		-8135		ļ		400		3/4°	 		+	
O-1ma			Sonic		200-	-8135			¬:	493		3/4°		+-		
Ā J	·				<u> </u>		<u> </u>		<u> </u>	100	1	3/4°	Ľ	<u> </u>		
					ï	PRODUCTION	TEST DA	ΤΑ								
OIL - Bbis/	day	GRAV	ITY - *API	COND. B		GAS - MCF/d		R - Bbls/day	H ₂ S	- Grain	35/100) cu. ft.	В.н.	P. ANI	D DEF	TH T
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	4								·							

I AM RESPONSIBLE FOR THIS REPORT, THE INFORMATION IS COMPLETE AND CORRECT.

William E. Booker, Geologist

NAME AND TITLE (PRINT)

GEDLOGICAL SURVEY DIVISION

WELL PLUGGING RECORD

(Submit in TRIPLICATE Within 30 Oays After Plugging is Completed)

PERMIT NUMBER
36942
FIELD NAME

PPG Oil & (Gas Co In	c., 2258 Fnte	rprise Drive	, Mt. Pleasant	, MI	48858	
COMPLETE LEAS	E OR FARM NAM	ME(S)	<u> </u>		<u> </u>		WELL NUMBER
Woodward							1-26
WELL LOCATION					TOWNS	HIP	COUNTY
NW %	NE 1/2	SW% SEC. 26	T. 171	I R. 9W	Her	sey	Osceola
TYPE OF WELL (Oil, Gas, Ory Hole,	etc.)		TOTAL DEPTH	FORMA	TION	<u> </u>
Dry Hole				8135	Ca	bot Head	
DATE PLUGGING	STARTED	OATE PLUGGING	COMPLETED	DEPT. REPRESENTA	TIVE(S)	VHO ISSUED PERM	IT OR WITNESSED
10-31-83		11-	1-83	PLUGGING	Jack	Snider	
				1			
		RECORD				BRIOGES OR PLUG	T
SIZE CASING	DEPTH SET	AMOUNT RECOVERED	SHOT OR RIPPED	TYPE (Brush, S Cement, Mechanic		DEPTH PLACED	SACKS OF CEMI
20"	77			Cement		7800-8140	100 Sx
11 3/4"	931			Cement		7000-7800	195 Sx
8 5/8"	5456			Cement		6800-7000	75 Sx
				Cement		5460-6800	400 Sx
				Cement		5060-5460	100 Sx
				Cement		500-5060	900 Sx
			·	<u>Cement</u>		0-500	150 Sx
Was the well plug			∏YES ⊠	If yes, give	name a	nd address:	
Contractor other	than Owner or	Operator?	<u> </u>	VO			
Contractor other	than Owner or			VO		sterson	
Contractor other	than Owner or of Owner, Opera	Operator? tor, Company, or C		VO			
Representatives colugging: DESCRIBE IN OET Ran open 6	of Owner, Opera	Operator? tor, Company, or C was Plugged pip to 8140'	Contractor who wi	tnessed <u>Will</u>	lie Ma	sterson lled drill p	
Representatives on the properties of the propert	of Owner, Operation of Own	Operator? tor, Company, or Co	Contractor who wi	tnessed Will 100 sx to 7800 e to 7000' and	lie Ma	sterson lled drill p ed 75 sx to	6800', pulled
Representatives on the properties of the propert	of Owner, Operation of Own	Operator? tor. Company, or Co	and spotted and drill pip 00 sx to 541	tnessed Will 100 sx to 7800 e to 7000' and 0', pulled dri	lie Ma O'. Pu spott ll pip	sterson lled drill p ed 75 sx to e to 5460' a	6800', pulled nd spotted
Representatives colugging: RESCRIBE IN OFT Ran open eand spotted drill pipe	of Owner, Operation of Own	Operator? tor. Company, or Co	and spotted ed drill pip 00 sx to 541 to 5060' an	tnessed Will 100 sx to 7800 e to 7000' and	lie Ma O'. Pu spott ll pip	sterson lled drill p ed 75 sx to e to 5460' a	6800', pulled nd spotted
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Representatives colugging: RESCRIBE IN OFT Ran open eand spotted drill pipe	of Owner, Operation of Own	Operator? tor. Company, or Co	and spotted ed drill pip 00 sx to 541 to 5060' an	tnessed Will 100 sx to 7800 e to 7000' and 0', pulled dri	lie Ma O'. Pu spott ll pip	sterson lled drill p ed 75 sx to e to 5460' a	6800', pulled nd spotted
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NAN				1	war Antidee	OF CONTRACTOR	5 8
	PPG Industries, 2258 Enterprise Mt. Pleasant, M	Drive			· Not Sel	lected	-
201	LOCATE WELL AND OUTLI		MI MI	COUNTY Osceola			PERMIT NUMBER
•	SECTION PLAT — 640		1 - 1				
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**	•		□ Hydroce	rbon Storage	1	After Rework	Number of Wells
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CERTIFICATION

I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting felse information, including the possibility of fine and imprisonment. (Ref. 40 CFR 144.32).

NAME AND OFFICIAL TITLE (Plaasa type of print)

R. D. Duncan Group V.P. Chemicals

DESCRIBE REWORK OPERATIONS IN DETAIL

USE ADDITIONAL SHEETS IF NECESSARY

SIGNATURE

DATE SIGNED

Logged intervals

WIRE LINE LOGS, LIST EACH TYPE

200-8135

3100-8135

200-8135

Log Types

LDT-CNL-GR

Dual Micro

Sonic

3106-

- (8)		DLOGICAL BURVE' LL PLUGGING I ATE WHIIN 30 Days A		plenedi	PERMI	36942 DE	C 0 2 1983
47	& Bonding	•	•	•	FIELDA	IAME	
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PPG 011 &	Gaa Co. Th	//e v /2/04.	rorise Drive	. Mt. Pleasant	MI 4	8858	
OMPLETE LEAS	E OR FARM NAM	AE(S)					WELL NUMBER
Woodward			the second second second second second second second second second second second second second second second se		T 44		1-26
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ATE PLUGGING	STARTES	DATE PLUGGING	COMPLETED	DEPT. REPRESENTA			T OR WITHESSED
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1 3/4"	77 - 931			Cement		7000-7800	195 8x
8 5/8"	5456			Cement		6800-7000	75 Sx
				Cement		3460-6800	400 Sx
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				Cement		300-5060	900 Sx
				Cament		0-500	150 00
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["I s' tion, and that the facts stated herein are true, correct and complete to the best of my knowledge. COMPANY NAME AND ADDRESS NAME AND TITLE (Typed or Printed) STRICKLER GEOLOGICAL SURVICES, INC. William E. Booker, Geologist

11-18-83

SIGNATURE

DATE (Month, Dev. Year)

1425 B. Mission

Mt. Plessant, MI 48858

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PPG. TRIES, INC. BOREHOLE COMPLET NATA

WORKOVER INFOFMATION

WELL Woodward 1-26 Page 1

Date Description Moved Lease Management Workover Rig #129 onto location. Rigged up, put well 6-6-85 head on and shut down for night. Picked up 2 - 6" D.C. 7-7/8" J-44c Serical #HJ075, started drilling out cement. 6-7-85 Drilled to approximately 300', cement very hard at surface. Worked till 20:00 hrs. and shut down for weekend. Drilled cement to approximately 800', then dropped thru to approximately 1200'. 6-10-85 then cement again. Drilled to approximately 1420' and shut down for nite. Drilling hard cement again. Drilling 55 min./30'. Drilled to 1875' by 6-11-85 20:00 hrs. Shut down for nite. Drilled cement to depth of 2250', still very hard cement. Shut down for nite. 6-12-85 Drilled cement to depth of 2750', still drilling hard. 6-13-85 Drilled cement out to depth of 3250', still drilling hard. 6-14-85 Drilled till noon. Drilled to 3750', still good hard cement. Shut down till 6-15-85 Monday. Finished drilling cement. Drilled to approx. 4250'. Cement still very 6-17-85 compacted. TOH standing, PU casing scraper and ran back to bottom. Drilled to 4270.57' 6-18-85 TOH, LD bit and two 6" collars. PU Baker permanent type bridge plug and ran in to set as close to bottom as possible. Set bridge plug at 4260. Pulled out of bridge plug and shut down for night. Displaced hole with clean fresh water. TOH standing. RU McCullough to log. 6-19-85 McCullough ran Gamma/Neutron log with CCL and Cement Bond log. Free pipe showed thru Reed City Dolomite, also showed some gas at top of free pipe from 3500'-3595'. Free pipe from TD to DV tool at 3495'. Shut down for night. Perf'd 8-5/8" casing at (4261') and (3503') with 4 holes each place. Ran in and 6-20-85 set cement retainer at 4237' KB. RU Halliburton and circulated gas out of hole. String into retainer and circulated between lower and upper perfs. Max. pressur 2000 psi. Blended 200 sks Class A cement, 2% CaCl, and water loss agent. Pumped cement away and displaced tubing. NOTE: lost 6 bbls of fluid to formation thru upper perfs while blending cement. TOH standing and shut down for the night.

PPG ' 'STRIES, INC. BOREHOLE COMPLETT' DATA

WORKOVER INFORMATION

WELL	Woodward	1-26

Page 2

Date	Description
6-21-85	PU 7-7/8" rerun bit J-44, Serial #HX352, casing scraper and TIH. Tagged
	cement retainer. No indication of cement. Circulated hole with 240 bbls H20.
	Lost approx. 20 bbls to formation. TOH standing. RU McCullough to rerun Cement
	Bond Log from TD - 3500'. Log still shows free pipe, no sign of any cement.
	PU stinger from cement retainer and run to bottom. RU Halliburton to pump
	down tubing to see if bottom perfs are still open. Broke circulation with
	1200 psi as compared to 1800 psi yesterday. Put dye in 30 bbls of H2O, started
	pumping to tally volume of annulus plus void. Return turned to brine after
	30 bbls of pumping and became very foamy. Got our dye water back and decided
	we were not stung in. Tried to sting in, could not. POH and shut down.
	Decided to perf 8-5/8" casing again with 4 holes right above cement retainer,
	run second retainer and squeeze again.
6-22-85	RU McCullough and perfed 4 holes at 4253) KB. PU Baker cement retainer.
	Started in to set at 4240'. Set cement retainer approx. 8' above perfs at
	4247' KB, confirmed by wireline. RU Halliburton. Broke circulation with
	1200 psi at 4 bbl/min, annulus was down 11 bbl. String into retainer. Broke
	circulation behind casing immediately, 1400 psi at 4 bbls/min. Mixed dye in
	30 bbl and pumped 308 bbls before retrieving to surface. Started pumping at
	10:34 a.m. Drilled out more cement. Mixed and pumped 300 sks Class A 2% CaCl
	with 3/4% Halide 322 and 150 sks of Thix-O-Tropic. Finished cementing 16:30,
	POH. Fourteen stands wet then dried up. Shut down til Monday a.m.
6-24-85	RU McCullough, ran Single Bore CCL. Tagged cement retainer at 4247 Ran
	cement bond logging tool. Found good bond at bottom. Top of cement up to
	3850'. Will have to squeeze cement from 3502'-3850'. Ordered out Baker cement
5	retainer to set at approx. 3440'. Ordered out 270 sks neat cement to squeeze
	with. Strapped drill pipe into hole and set CR at 3457.00'. RU Halliburton for
	flow test. Pumped 2 bbl/min at 2000 psi, pressure dropped to 1600 psi. Mixed
	300 sks neat cement and squeezed into perfs. Displaced drill pipe and cement
	retainer. Left some cement in casing. Ended squeeze with 2000 psi on cement.
	Stung out of CR and TOH. Shut down for the day.
6-25-85	Drilled out cement retainer and cement below. Ran in and tagged lower cement
	2/8

PPG D' TRIES, INC. BOREHOLE COMPLETTY DATA

WORKOVER INFORMATION

WEIL	Woodward 1-26
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Page _3

Date	Description
6-25-85	CONTINUED
	retainer at 4247'. Tripped out standing and installed upper tree and rigged
	Halliburton to do casing integrity test. Pressured casing to 3000 psi. Surface
	pressure held pressure for 20 min. No leak off; released pressure and shut down
	for the night.
6-26-85	Removed upper tree section, installed flow nipple, picked up casing scraper,
	two 6" drill collars, one 4-3/4" drill collar and tubing; ran in and tagged
	cement retainer at 4247'. Circulated hole. Changed hole over to clean fresh
	water. Tripped out of hole standing and laid down 4-3/4" and 6" drill collars.
	Tripped back in hole with open-ended tubing to 4160' KB. Ready to spot acid.
	Shut down til Monday, July 1, 1985.
7-1-85	Rigged up Halliburton & spotted 750 gallons, 20% HCl acid from 4150 up across
	perf interval. Pulled 2-7/8" tubing from hole laying down. Rigged up
أسسسا	McCullough to perf from 3995'-4144'; total of 82 holes (see log for intervals).
	Finished perforating and rigged down. Installed upper tree section and wait on
,	Halliburton. Rigged Halliburton to do pump test. Tested lines to 300 psi and
	started to pump. No flow at 500 psi. Perfs taking some flow, but very tight.
	Achieved 22 bb1/min at 2900 psi. Shut down for line leak and decided to stay
	down for the night. Ordered 8000 gallons 20% HCl to be on location for 0700
	pumping. Will treat with 8000 gallons of acid and 120 perf balls 1.4 SP gravity
7-2-85	Acid arrived 0600. Rigged acid trucks and tested lines for leaks. Repaired
	leaks in lines and wellhead. Pumped acid at rate of 15 bbl/min, dropped 120
	bbls then displaced with 2% KCl water. Got good balling action. Rigged down
	upper tree section and picked up bit casing scraper and ran in to TD to remove
	balls from perfs. Tripped out standing and put on upper tree section. Rigged
	Halliburton to do second pump test. Good pump test, max. flow 27 bbl/min at
	2570 psi. Could not pump any more with available horsepower. Rigged down
	Halliburton and shut down for the night.
7-3-85	Removed upper tree section and ran tubing into hole. Tripped out laying down.
	Picked up 45" casing tail pipe, 8-5/8" lok-set Baker backer and 45" casing
	and ran in; set packer at 3900'. Landed in donut and installed upper tree

PPG TRIES, INC. BOREHOLE COMPLETE DATA

WORKOVER INFORMATION

WELL	Woodward		
		Page	4

Description
CONTINUED
section with new ring gasket. Rigged down Lease Management Rig #129 and
shut down.
Pumped 45 gallons mineral oil into annulus. Filled remainder with fresh water
Pressured annulus to 2000 psi and held for 10 minutes. Installaed gauge and
shut in.
Pressure on annulus reading 1400 psig. Pumped up to 1900 psig with water for
test in presence of DNR and EPA officials; test okay.
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FMICHIGAN STA DEPARTMENT

NATURAL RESDURCES

LOG OF OIL, GAS, DISPOSAL OR STORAGE WELL (ACT 61) Submit in DUPLICATE Within 30 Days after Well Completion

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DEEPENING PERMIT NUMBER	

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	SIIMU	LAI	ION BY ACI	D OR FRAC	TURING		WAT	ER	FILL UP	(F.U.	OR L	OST C	IRCUL	ATIO	N (L.C	(X)	
DATE	-		Treated	Material	s and amoun!	usea	FORM	TAN	ION	F.U.	L.C.	DEP	ŤH		АМО	UNT	
5-18-84	80	26-	-45	<u>500 ga</u>	l. Fe Ac	id											
						<u>.</u>					1 1						
											1						
							-					-					
										<u> </u>							
	месна	NIC	AŁ LOGS, L	IST EACH 1	TYPE RUN		DEPTH CO	ORF	RECTION	DE	VIATIO	วก รบ:	RVEY	PLI	JGGE	DBAC	:K
					T		т			н							
					 	TERVALS	DEPTH		ORRECT'N	┩}	JN AT		REES	YES	NO	1 DE	PTH
					100 -		ļ	+-			1900 4270	3/4		 	+	-	
Birdwell Dual-Micro 3250					3250 -			+	····	3	<u>4270</u>	1/2 2°	<u> </u>		+	-	
						8098		+-		7	<u>6050</u> 7440	$\frac{ 2 }{1/2}$	0	-	+	+	
<u> </u>			LALLO SUIL	<u>+ u </u>	1 0400 -	0090	1			11	, 44U	1 1 / 4		ш	4		
					PA	DDUCTION	TEST DA	ГА									
OIL - Bols/	day G	RAN	ITY - OAP	I COND. B	bis/day G	AS - MCF/0	ay WATE	R -	- Bbls/day	HaS	Grain	15/100	cu. ft.	В.н.	P. ANI	D DEP	TH -

I AM RESPONSIBLE FOR THIS REPORT. THE INFORMATION IS COMPLETE AND CORRECT.

NAME AND TITLE (PRINT)
William E. Booker, Geologist DATE 5/29/84 B-25

1 MMCF

NAME(S) & ADDRESS OF OWNER(S) SHOWN ON PERMIT

DATE

9/20/84

NAME AND TITLE (PRINT)

William E. Booker, Geologist 3-26

NUTICE REPORT COMPLETE SAMPLE AND FORMATION RECORD AND DRILL STEM TEST INFORMATION ON REVERSE SIDE

STATE OF MICHIGAN
DEPARTME OF NATURAL RESOURCES
LOG OF OIL, GAS, DI JSAL OR STORAGE WELL (ACT 61) Submit in DUPLICA's Within 30 Days after Well Completion

PERMIT NUMBER 37519 DEEPENING PERMIT NUMBER

R 7210

NAME & ADDRESS OF DRILLING CONTRACTOR(S)

PPG OIL 2258 En						į	INDRI PO Bo	-										
				58					asant.	MI	488	858						
Mt. Ple			NUMBER	SHOWN OF	VPERMIT							DIR		NALL		ILLEC	<u> </u>	
MILLER												YES		NO				
SURFACE LO		ION		SECTION		TOWNSHIP	•	A.	ANGE			I .		NAM	E			
SE NE S				26	-	17N		_L	9W			1	erse	-				
FOOTAGES			th/South)		r.co	• -	ast/West)							NAME				
852 F	t. fro	m N	orth_c	SECTION			East Li			ectio	in	Osceola						
=-	SW NW SW 25							TOWNSHIP RANGE						TOWNSHIP NAME				
	OOTAGES (North/South)							1					erse	NAME		<u> </u>		
-	634 Ft. from South Line and 558 Ft.							ine o	of quaeter	eactio	20	1 -	sceo	_				
TORILLING					TYPE WEL													
1 7/0/		30.1		1	25 Log		Gas we		-			į –	-	HEVE	TIO:	JS		
7/9/		MPLET	ED.		ION AT T.D.		FT. DRLD.			roo:	15	K.B.			ATIONS			
A 0/9/				Cabot			From 0						9.7			38.3	3	
WELL CO		TED		1	NG FORMAT	ION(S)	FT, DALD.				-	R.T.			Grd.			
=				1,40000	MO FORMA	1014(3)	From			-		1				.22.9	9	
9/1/	04			<u> </u>	<u> </u>		1					<u></u>			<u> </u>			
•	CASI	NG, CA	SING LINE	RS AND C	EMENTING					P	ERFOR	RATIO	NS					
SIZE		WHER	ESET	CEA	MENT	Ft. Pulled	1	Π,	NUMBER							OF	PEN	
6"	1	615			sx		DATE		HOLES	1	NTER	VALP	ERFO	HATE	D	YES	N	
1-3/4"	1	915			sx		9/13/	84	2/ft	83	28-83	343	(30x	<u> </u>		X	1	
	 				sx lst	stage		_					(50.	-/		 	1	
8-5/8" ((5432															_	
8-5/8''		<u>5432</u>					1	- 1	i	ì					1			
8-5/8''		5432													·	<u> </u>	<u></u>	
		SROSS	PAY INTE	RVALS	T 70		ALL OTHE			AS S	HOWS						<u> </u>	
FORMA	TION	GROSS	PAY INTE	RVALS FROM	TO 8358MD		ALL OTHE		IL AND G		HOWS	Sam-		OR L	ERV!	EO (X	Ful	
	TION	GROSS	PAY INTE	FROM 8327	8358MD	FORM	IATION	OF	OIL IGAS	ĐΕ	РТН		WHER	E 085	ERV	Gas Log	Fii) Up	
FORMA	TION	GROSS	PAY INTE	RVALS FROM	8358MD	FORM	IATION	O Pi	OIL IGAS Gas	0E 40	РТН 75	Sam-	WHER	E 085	ERV!	EO (X Gas Log.	Fii) Up	
FORMA	TION	GROSS	PAY INTE	FROM 8327	8358MD	FORM	IATION	O Pi	OIL IGAS	ĐΕ	РТН 75	Sam-	WHER	E 085	ERV!	Gas Log	Fii) Up	
FORMA	TION	GROSS CO E	PAY INTE	RVALS FROM 8327 (8050	8358MD 8075TVD	FORM	Lty	9 9 9	OIL IGAS Gas Gas	40 30	75 10	Sam- ples	WHE R	E OBS	Mud Line	Ges Log X	Fill Up	
FORMA	TION	GROSS CO E	PAY INTE	RVALS FROM 8327 (8050	8358MD 8075TVD	FORM	Lty	9 9 9	OIL IGAS Gas	40 30	75 10	Sam- ples	WHE R	E OBS	Mud Line	Ges Log X	Fill Up	
FORMA	TION 31uf	GROSS G E	PAY INTE	RVALS FROM 8327 (8050	8358MD 8075TVD	Reed Ci Antrim	Lty	OR (OIL IGAS Gas Gas	40 30	75 10	Sam- ples	WHER Odor	E OBS	Mud Line	Ges Log X	Fu) Up	
FORMA Burnt E	TION 31uf STIM	GROSS G f	PAY INTE	RVALS FROM 8327 (8050	8358MD 8075TVD ACTURING	Reed Ci Antrim	LEY WAT	OR (OIL IGAS Gas Gas	40 30	75 10	Samples	WHER Odor	E OBS	Mud Line	Gas Gas Cog X X	Fu) Up	
FORMA Burnt E	TION 31uf STIM	GROSS G f	PAY INTE	FROM 8327 (8050	8358MD 8075TVD ACTURING	Reed Ci Antrim	LEY WAT	OR (OIL IGAS Gas Gas	40 30	75 10	Samples	WHER Odor	E OBS	Mud Line	Gas Gas Cog X X	Fu) Up	
FORMA Burnt E	TION 31uf STIM	GROSS G f	PAY INTE	FROM 8327 (8050	8358MD 8075TVD ACTURING	Reed Ci Antrim	LEY WAT	OR (OIL IGAS Gas Gas	40 30	75 10	Samples	WHER Odor	E OBS	Mud Line	Gas Gas Cog X X	Ful Up	
FORMA BUENT E	TION 31uf STIM	GROSS G f	PAY INTE	FROM 8327 (8050	8358MD 8075TVD ACTURING	Reed Ci Antrim	LEY WAT	OR (OIL IGAS Gas Gas	40 30	75 10	Samples	WHER Odor	E OBS	Mud Line	Gas Gas Cog X X	Ful Up	
FORMA BUENT E	TION 31uf STIM	GROSS G f	PAY INTE	FROM 8327 (8050	8358MD 8075TVD ACTURING	Reed Ci Antrim	LEY WAT	OR (OIL IGAS Gas Gas	40 30	75 10	Samples	WHER Odor	E OBS	Mud Line	Gas Gas Cog X X	Fu) Up	
FORMA Burnt B	STIM 83	GROSS GE MULAT Atterval 2.8-4	PAY INTE	FROM 8327 (8050 ID OR FRAM Materi	8358MD 8075TVD ACTURING ais and amoun . 15%	Reed Ci Antrim	LEY WAT	OR ((Gas Gas Gas Gas	40 30 F.U.	75 10 OR LC	Samples DST C	Odor IACUL TH	E OBS	N (L.	Gas Gas Cog X X	Fill Up	
PORMA Burnt E DATE 9/13/84	STIM 83	GROSS GE MULAT Iterval 2.8-4	PAY INTE	FROM 8327 (8050) ID OR FRAM Materia 500 gal	8358MD 8075TVD ACTURING ais and amoun . 15%	Reed Ci Antrim	WAT FORM None	OR (Gas Gas Gas FILL UP (40 30 F.U.	75 10 OR LC L.C.	Samples OST C DEP	Odor IACUL TH	PLS PLS	Mud Line N (L.)	C.) (X))	
FORMA Burnt B DATE 9/13/84	STIM 83	GROSS GE MULAT Iterval 2.8-4	PAY INTE	FROM 8327 (8050) ID OR FRAM Materia (500 gall)	8358MD 8075TVD ACTURING ais and amoun . 15%	Reed Ci Antrim	WAT FORM None	OR (Gas Gas Gas Gas	96 AU	75 10 OR LC. L.C.	Samples DST C DEP	RVEY	E OBS	Mud Line N (L.)	C.) (X)	Fill Up	
PORMA BUTHE DATE 9/13/84 Brand Schlum*	STIM 83	GROSS GE MULAT Iterval 2.8-4	PAY INTER	FROM 8327 (8050) ID OR FRAM Materia (500 gall)	8358MD 8075TVD ACTURING ais and amoun . 15%	Reed Ci Antrim	WAT FORM None	OR (Gas Gas Gas FILL UP (96 AU	75 10 OR LC L.C.	Samples DST C DEP	RVEY	PLS PLS	Mud Line N (L.)	C.) (X))	
FORMA BUTHE DATE 9/13/84 Brand Schlum*	STIM 83	GROSS GE MULAT Iterval 2.8-4	PAY INTER	FROM 8327 (8050 ID OR FRAM Materi 500 gall	8358MD 8075TVD ACTURING ai» and amoun . 15% ITYPE RUN LOGGEO 11 100-84 6600-84	Reed Ci Antrim	WAT FORM None	OR (Gas Gas Gas FILL UP (96 AU	75 10 OR LC. L.C.	Samples DST C DEP	RVEY	PLS PLS	Mud Line N (L.)	C.) (X))	
PORMA BUTHE DATE 9/13/84 Brand Schlum Birdwe	STIM 83	GROSS GE MULAT Iterval 2.8-4	PAY INTER	FROM 8327 (8050 ID OR FRAM Materi 500 gall	8358MD 8075TVD ACTURING ais and amoun . 15% I TYPE RUN LOGGEO II 100-84 6600-84 3150-54	Reed Ci Antrim	WAT FORM None	OR (Gas Gas Gas FILL UP (96 AU	75 10 OR LC. L.C.	Samples DST C DEP	RVEY	PLS PLS	Mud Line N (L.)	C.) (X))	
PORMA BUTHE DATE 9/13/84 Brand Schlum* Birdwe	STIM 83	GROSS GE MULAT Iterval 2.8-4	PAY INTER	FROM 8327 (8050 ID OR FRAM Materi 500 gall	8358MD 8075TVD ACTURING ai» and amoun . 15% ITYPE RUN LOGGEO 11 100-84 6600-84	Reed Ci Antrim	WAT FORM None	OR (Gas Gas Gas FILL UP (96 AU	75 10 OR LC. L.C.	Samples DST C DEP	RVEY	PLS PLS	Mud Line N (L.)	C.) (X))	
DATE 9/13/84 Brand Schlum***	STIM 83	GROSS GE MULAT Iterval 2.8-4	PAY INTER	FROM 8327 (8050 ID OR FRAM Materi 500 gall	8358MD 8075TVD ACTURING all and amount 15% 15% 100-84 6600-84 3150-54 7000-84	Reed Ci Antrim	WAT FORM None DEPTH CO	OR (()	Gas Gas Gas FILL UP (96 AU	75 10 OR LC. L.C.	Samples DST C DEP	RVEY	PLS PLS	Mud Line N (L.)	C.) (X)	Sul Europe	
DATE 9/13/84	STIN 83	SROSS GE MULAT Iterval 2.8-4	PAY INTER	FROM 8327 (8050) ID OR FRAM Materia (8050) ID OR FRAM MATERIA (8050) ID	8358MD 8075TVD ACTURING ais and amoun . 15% 17YPE RUN LOGGEO II 100-84 6600-84 3150-54 7000-84	Reed Ci Antrim	WATION LETY WATIFORM NONE DEPTH CO	OR (CO	Gas Gas FILL UP (ON 1	DEV	75 10 OR LC L.C.	Samples OST C DEP	RVEY REES	PL YES	Mudd Line N (L.) AMC	C.) (X)) Full Up	

" STÀTE OF MICHIGAN
EPARTMENT OF NATURAL RESOURCES
GEOLOGICAL SURVEY DIVISION

Manderal WELL COMPLETION REPORT TO BE FILED WITH THE SUPERVISOR WITHIN 60 DAYS AFTER COMPLETION OF WELL (ACT 315, P.A. 1969)

SUBMIT IN TRIPLICATE

NAME DF	OWNER O	R OPER	ATOR				ADDR	ESS OF OWNER	OR OPERAT	OR				
	L & GA						2258 Enterprise Drive							
	-		•				1	. Pleasant,						
NAME OF	DRILLING	CONTR	ACTOR				ADDRESS OF DRILLING CONTRACTOR							
	DRILL				•		1315 S. Mission							
							Mt. Pleasant, MI 48858							
WELL NAM						- <u>.</u> .	WELL	NUMBER	PERMIT N					
Lut				· · · · · · · · · · · · · · · · · · ·			SECTION	1-34 ON	005-84	11-36/	RANGE			
	NW NE							34		.7N	9	 IJ		
OWNSHIP	III III						COUN		·					
Hersey								Osceol	.a					
OOTAGE	500		_ Ft. fro	om No	orth	Line and	500	Ft. from		lest L	ine of quarte	er section		
ATE DRIL	LING COM	MENCE	D			OMPLETED	DATE	WELL COMPLET		TYPE OF	WELL			
6-	28-84				6-23-	-84	-	6-23-84	1	Abando	oned Tes	t		
OITAMRO	N COMPLE	TED IN	4	TOTAL DEF	тн		ELEVAT	ON KB	ЯB	ЯŢ	AF	GN		
Ni	agaran				7881			1193.8			1192.2	1176.		
T YRATOR				7.0			1	TOOLS	_					
From			Feet	το . /8	881	Feet	Fro	m	Fer	et to		Fee		
						WELL CASI	NG REC	ORD						
7	UBING AN	ID CAS	ING DA	TA	ļ	CEMENT	TING DATA PERFORATIONS OR DPEN HOLE					HOLE		
SIZE	LB./FT.		ADE	OEPTH	SAC		STAGI	NG OEPTHIS)	NO, HOL	ES F	ROM	то		
24"	132 54.5		<-55 1- 40	65 860	D.P 950		<u>ا</u>							
13 3/8" 9 5/8"			N-80	5430		00/200 Com/		670-DV Too						
9 3/0	43.5	- - 1		1 3 3 3 0		0/100 Com/								
" ' ' ' ' '	w	ATER	ZONES					WIRE LIN	IE LOGS R	UN				
FDRMA	TION	FROM	то	AMOL	TNU	SERVICE CO	MPANY	TYPE LOG	IN	TERVAL LE	GGED	COPY TO SURVEY		
	(Fresh)			-		Schlumber	Det	LDT-CNL-GH		100 - 78	81	Yes		
None								DI.I./MT.T.		300 - 41		Yes		
								<u> </u>						

					1	1		1				- -		
FR	ACTURE	OR A	ID TR	EATMENT		-		SOLUT	ON MININ	IG				
TAD	E	FRDM	TO	QUANT	[ITY		NUMBE	DF INJECTION	AND TARE	SET WELL -	- DISTANCE	APART		
None		<u>-</u>				None								
			-			Ţ								
			+											
 -												,		
											·-·			
						-								
				The inform	nation in	t and attached to	this repor	t is complete and	correct,					
SIGNATUR						TITLE								
)	111.			B I		Geo	logist				8/13/	84		

STATE CE MICHIGAN

DEPARTMENT OF NATURAL RESOURCES

GEOLC

4L SURVEY DIVISION

MINERAL WELL PLUGGING RECORD

File in DUPLICATE Within 30 Days After Plugging is Completed

PERMIT NUMBER
005-841-367

	7		111011109911910		-		DATE		
•							8/13/8	۵	
OWNER DR OF	PERATOR						<u> </u>		
PPG Of	1 & Gas Co.,	Inc.							
ADDRESS									
2258 E	Enterprise Dr	ive, Mt. Pla	easant, MI	48858	3			·	
WELL NAME							WELL NUMBER		
Lutz			<u>.</u>						
WELL LOCAT		1/ CFO				011	TOWNSHIP	1	_7_
NW ¼	NW ¼	NE ¼ SEC	. 34	<u>. 171</u>	I R.		Hersey FORMATION	Usce	ота
	•				1017	7881			
Abando	ned Test Wel		SING COMPLET	ED	WAS PER			SOURCES	-
			6-23-84	-0	OSTAINE	DBEFORE	PLUGGING BEGAN?	**	□ NO
6-23-8	PARTMENT REPRE	SENTATIVE WHO A		R SUPE	RVISEDPL	UGGING		223	
-	Snider								
Jack	Diffrer -			<u>.</u>					
	1		T	1			,	050711	1
CASING SIZE	WHERESET	AMOUNT RECOVERED	SHOT OR RIPPED	[TYP	E OF SRID	GES OR PLUGS	PLACED	NUM5
24"	65	None		1	Cement			5900	210
13 3/8"	860	None			Cement	•		6890	280
9 5/8"	5430	None		(Jement			IP COUNTY Sey Osceol Sey Osceol Segaran NATURAL RESOURCES BEGAN? XX YES DEPTH PLACED 5900 6890 7860 7860 ipe to 6890' sx for kick off plus (USE REVERSE SIDE diaddress:	265
									<u> </u>
									<u> </u>
				<u> </u>					<u> </u>
							(US	E REVERSE SID	E IF NEE
	ubing, casing, etc., efore or during plu		Y!	ES	NO 🖾	If yes, gi	ve details:		
Did a Service	: Company pump i	nud				If ves. ai	ve name and address:		
	or set bridge plug		KX Y	es l	NO		iburton		
			(==						
	plugged by a Com			ES	₩ мо	If yes, gi	ve name and address:		
ontractor o	ther than Owner o	or Operator?	·	E3					
Representative	s of Dwner, Operator	•			ging				
		Wil	<u>lie Master</u>		IFICATE	<u></u>			
• T.T	Villiam E. Bo	olor				er Geol	ogical Services.	Inc.	(compan)
state that I a	m authorized by s facts stated herein	aid Owner ar Oper	rator to make ti	his repo	rt; and tha	t this repo			
SIGNATURE		lare true, correct o	ADDRESS 1425 S.				TITLE Geo	logist	
Walle	· 5 P	20-th					ur, pr Geo.	TARTOR	***************************************
OEPARTMENT	T REPRESENTATIV	/E	FI	INALI	NSPECTIO	NS		DATE	
PECMATIMEN.	. HE RESENTATI	-						1	
OEPARTMEN'	T HEPRESENTATIV	/E		F) 4	20			DATE	
				B - 3	ئ ك			1	

STATE OF MICHIGAN EPARTMENT OF NATURAL RESOURCES GEOLOGICAL SURVEY DIVISION

MINERAL WELL COMPLETION REF RT D BE FILED WITH THE SUPERVISOR WITHIN DAYS AFTER COMPLETION OF WELL (ACT 315, P.A. 1969)

SUBMIT IN TRIPLICATE

NAME DE	OWNER C	DR D	PERA	TOR					ADDR	ESS OF DWNER	OR OPE	PATOR			
	•••••								ļ						
PPG	Oil &	Ga	s Co	.,]	Inc.					58 Enterpri . Pleasant,					
NAME OF	DRILLING	CD	NTRA	стоя	1				ł	ESS OF DRILLIN	-		9		<u></u>
D	n		ina	Come					1315 S. Mission						
Blg	ard Dr	111	ing	COmb	Dany				1315 S. Mission Mt. Pleasant, MI 48858						
WELL NAM	ε									NUMBER	PERMIT		EB -		
Lut	z				-				1	-34A			341-36	7	
LOCATION									SECTIO		TWP.		1	RANGE	
NW NW NE									501117	34	<u> </u>	17N		9	W
Township Hersey									COUNT	0sceola					
FODTAGE	500)		t. fro	n Nor	th		Line and	500			Vest			
				· t. 110	N c	r S						or W			rtar section
7-1-84 DATE DRILLING COMPLETED						LETED	DATE	VELL COMPLET 7-10-84	ED	TY	PE OF W	_	d Test		
FORMATION COMPLETED IN TOTAL DEPTH							ELEVATI		ЯB	RT	T	RF	GN		
Niagaran 8447									1193.8	<u> </u>			1192.	2 1176.8	
ROTARY TI	ools 0			Feet	••	8447		Feet	CABLE From	TOOLS		_			
7.011						0447						Feet to			Feet
			·			r	W	ELL CASIN	IG RECO)KD					
	UBING A	- 1		-	T	<u> </u>		CEMENTI					OR OPEN	HDLE	
24"	LB./FT.	\dashv	GRAD		DEPTH	1	cks	TYPE	STAGING DEPTH(S) NO. HOLES FROM T					то .	
	130	-	K-5 H-4		65 860	DP 950		Comm/Cl	1 A						
9 5/8"		1	N-8	~	5430			200 Comm							
									/C1 A 3670 DV Tool						
					<u> </u>	L <u>-</u>					<u> </u>		Ĺ		
	W	ATE	ER ZO	NES	;					WIRE LIN	E LOGS	RUN			_
FORMA	TION	FR	МО	то	AMDL	NT	Sı	ERVICE COM	PANY	TYPE LOG		INTER	VAL LOG	GED	CDPY TO SURVEY
	(Fresh)														
Non	<u>e </u>	<u> </u>					No	ne							
		-					╢								
					- 		∦-								
FR 4	CTURE	OR	ACID	TRI	EATMENT					SOLUTI	ON MIN	ING			
DATE			рм [TO	QUANT	ITY	1	NAME AND	NUMBER	OF INJECTION			VELL - 0	DISTANC	E APART .
None								None							
							 								
							 	· · · · · · · · · · · · · · · · · · ·							
			$\neg \uparrow$		1									<u> </u>	
							**								
					The inform	ation i	n and	stroched to t	his report	is complete and	COFFEE			<u></u>	
SIGNATURI	=					_,.vii ii	. 2:10	, 				 		DATE	-
(()								Geolo	gist				'		13/84
	ince		<u> </u>		regue			В-:							_ - `
					GIVE	OMPLE	ETE F			ON REVERSE S	IDE				

STA OF MICHIGAN DEPARTMENT OF NATURAL RESOURCES GEOLOGICAL SURVEY DIVISION

MINERAL WELL PLUGGING RECORD

File in DUPLICATE Within 30 Days After Plugging is Completed

PERMIT	TNUMBER	
	024-841-367	
DATE	0/10/0/	

							8/13/	84	
DWNER OR OP	ERATOR								
PPG O	il & Gas Co.	, Inc.							
ADDRESS 2258	Enteprise Dr	ive, Mt. Ple	asant, MI 4	8858					
WELLNAME					-		WELL NUMBER	-34A	<u>-</u>
Lutz	ON					· · ·	TOWNSHIP	COUNTY	
NW 1/4	NW 1/4	NE ¼ SEC	. 34 T.	17N	***	9W	Hersey	0sce	pla
	L (Brine, Disposal, Si oned Mineral				TOTAL D		FORMATION Niagaran	-	
DATE PLUGG! 7-11-			ING COMPLETED)	WAS PERM OBTAINED	SSION D BEFORE	F DEPT, OF NATURAL REPLUCEING BEGAN?	ESDURCES XXX YES	□ ND
NAME OF DEP	ARTMENT REPRES			SUPER	VISED PLU	GGING			
Jack	Snider							···	
CASING SIZE	WHERE SET	AMDUNT RECOVERED	SHOT OR RIPPED		TYPE	OF BRID	GES OR PLUGS	DEPTH PLACED	NUMBE SACKS
24"	65	None			ement			8448	100
13 3/8"	860	None			ement			8100	130
9 5/8"	5430	None			ement	77.2 1 7	11	7400	18: 130
			 	<u>C</u>	ement -	KICK I	Lug	6800	1
									
	<u> </u>	<u> </u>	<u> </u>			*			
	ed 130 sx.	ill pipe to	7400 and s		eu 103 :	, ди.	lled drill pipe t	.0 0000 21	
							(US	E REVERSE SIC	E IF NEED
	ubing, casing, etc., fore or during plu		YES	s [8	⊠ NO _	If yes, gi	ve details:		
Did a Service	Company pump n	nud,				If yes, gi	ve name and address:	····	
spot cement,	or set bridge plugs	s?	XXYES	S L	NO	натт	iburton		
	plugged by a Com ther than Owner o		YES	s &	☑ NO .	lf γes, gi	ve name and address:		
Representatives	of Owner, Operator		ractor who witnesse	d pługg	ging .				
	Willie Mas	sterson		CERT	IFICATE				
state that I ar	William F. Bo m authorized by sa facts stated herein	id Owner or Oper	ator to make this	of <u>St</u> s repor	rickler t; and that	this repo	gical Services. It was prepared under m		(company and directi
SIGNATURE		B, oh.	ADDRESS 1425 S. 1				ant, MI Geol	ogist	
			FIN	AL IN	SPECTION	S			
DEPARTMENT	REPRESENTATIV	É.						DATE	
DEPARTMENT	REPRESENTATIV	'E		B-3	2			OATE	

STATE OF MICHIGAN EPARTMENT OF NATURAL RESOURCES GEDLOGICAL SURVEY DIVISION

IV! NERAL WELL COMPLETION REPO. TO BE FILED WITH THE SUPERVISOR WITHIN 60 DAYS AFTER COMPLETION OF WELL (ACT 315, P.A. 1969)

SUBMIT IN TRIPLICATE

NAME OF O	NAME OF OWNER OR OPERATOR								SS OF OWNER		OR				}.	
PPG OIL	& GAS	COMPAI	NY, I	INC.					Enterprise		5				,	
	•		-				ļ	ME. I	Pleasant, M	11 48858	5				1	
NAME OF D	AILLING	CONTRA	CTOR				- -	ADDRES	SS OF DRILLIN	G CONTRA	стоя			<u>_</u>		
								ים ∩מ	ox 668						1	
INDRIL,	INC.								ox oos Pleasant, M	T 4885	R					
															'	
WELL NAME								WELL N	IUMBER R	PERMIT N						
LUTZ			m					SECTION TWP.					RANGE			
NW1/2 NW1/2	NE ¹ Z							34		17N			9W	••	Ī	
TOWNSHIP		***************************************					-	COUNTY								
Hersey								0sced	ola 							
FDOTAGE	500		Ft. fro		orth		_ine and	500	Ft. from	Wes			ine of quar	ter section		
N or S DATE DRILLING COMMENCED DATE OFFILLING COMPLETED								DATE V	VELL COMPLET	E o	r W I TYP	E OF 1				
8/2/84	<u></u>									=	l			ral tes	st !	
	FORMATION COMPLETED IN TOTAL DEPTH							ELEVATIO	ON KB	RB	RT		RF	GN		
Niagaran 8837'									1193.8				1192.2	117	76.٤	
ROTARY TO								CABLE								
From 0 Feet to 8837 Feet From Feet to Feet													Feet			
WELL CASING RECORD																
TU	JBING AN	O CASIN	G DA	TA			CEMENTI	NG DATA				TIONS	OR OPEN	HOLE		
SIZE 24"	LB./FT.	GRA		DEPTH	SAC		TYPE	STAGIN	IG DEPTH(S)	NO. HOL	ES	F	ROM	TO	<u> İ</u>	
	130 54.5		-55 /0	66	D.P			۸								
13-3/8 9-5/8	43.5		-40 -80	860 5430			mmon C1 0/200 co							,	-	
		1		1			0/200 co 0/100 co			V Tool						
	W	ATER Z	ONES	3					WIRE LIN	E LOGS F	RUN				1	
FORMAT	וסמו	FROM	то	AMOL	NT	SI	ERVICE CON	IPANY	TYPE LOG	11	NTERV	/AL LC	GGED	SURVE	ID _	
	(Fresh)		-			N	ONE									
NONE			-			<u> </u>		<u> </u>						 		
			-			-		·							<u>-</u>	
			1							-						
FRA	CTURE	OR AC	ID TR	EATMENT			-		SOLUT	ION MINI	NG				,	
DATS		FROM	то	QUAN	ITY		NAME ANO	NUMBER	OF INJECTION	AND TAR	GET V	VELL -	- DISTANC	E APART		
NONE						N	ONE							· · · · · · · · · · · · · · · · · · ·		
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						n and		this report	is complete and	correct.			T = : ==			
SIGNATUR	E; /	13	>	RI	1		TITLE						DATE	20.7	1	
<i>'</i> .V 2	SIGNATURE & Booker Geol							gist				•	10/4/	84		
				CIVE	COMPL	CTE 1		33	ON REVERSE	SIDE						

STATE OF :HIGAN DEPARTMENT OF NATURAL RESOURCES GEOLOGICAL SURVEY DIVISION

MINERAL WELL PLUGGING RECORD

PERMIT NUMBER 027-841-367

DATE

File in DUPLICATE Within 30 Days After Plugging is Completed

DEPARTMENT REPRESENTATIVE

DATE ABANDONED HOLE 7-31-B4 OWNER OR OPERATOR PPG 0il & Gas Co., Inc. 2258 Enterprise Drive, Mt. Pleasant, MI WELL NAME WELL NUMBER Lutz (Abandoned Hole) 1-34C WELL LOCATION TOWNSHIP COUNTY NW % NW 1/4 NE 1/4 SEC. 34 17N R. 9W Hersey Osceola TYPE OF WELL (Brine, Disposal, Storage, or Test) TOTAL DEPTH FORMATION Dry Hole 7,319' A-2 Salt WAS PERMISSION OF DEPT. OF NATURAL RESOURCES
OBTAINED BEFORE PLUGGING BEGAN?
DY MIKE MOSS
XX YE DATE PLUGGING STARTED DATE PLUGGING COMPLETED 7-29-84 7-29-B4 XX YES ם אם NAME OF DEPARTMENT REPRESENTATIVE WHO AUTHORIZED OR SUPERVISED PLUGGING CASING AMOUNT SHOT OR WHERE SET TYPE OF BRIDGES OR PLUGS DEPTH NUMBER SIZE RECOVERED RIPPED PLACEO SACKS Cement 5,900 150 Cement 5,500 200 DESCRIBE IN DETAIL HOW WELL WAS PLUGGED Lost hole, tools could not be recovered. Plugged back from 6,799'-5,900' with 150 sacks HOWCO Lite and from 5,900'-5,500' with 200 sacks Kick cement. (USE REVERSE SIDE IF NEEDE Were tools, tubing, casing, etc., lost or left If yes, give details: X YES □ио in the hole before or during plugging? Did a Service Company pump mud, If yes, give name and address: Halliburton Services X YES spot cement, or set bridge plugs? NO Box 519, Kalkaska, MI 49646 Was the well plugged by a Company or If yes, give name and address: Contractor other than Owner or Operator? ои 🕅 YES Representatives of Owner, Operator, Company, or Contractor who witnessed plugging W. Masterson **CERTIFICATE** Donald P. Smith of PPG 0il & Gas Co., Inc. state that I am authorized by said Owner or Operator to make this report; and that this report was prepared under my supervision and direction and that the facts stated herein are true, correct and complete to the best of my knowledge. A2258 Enterprise Drive TITLE Exploration Engineer <u>Pleasant, MI 48858</u> FINAL INSPECTIONS DEPARTMENT REPRESENTATIVE DATE

B - 35

STATE OF MICHIGAN DEPARTMENT NATURAL RESOURCES

GEOLOGICAL SURVEY DIVISION

MINERAL WELL PLUGGING RECORD

PERMIT NUMBER 025-841-367

	The moon Enga	CIE MITTILL 20 DAA?	Kitter i italiganig is	Compilete	·u	DATE		
						10/4/84		
WITER OR OP	ERATOR					TO1 41 04		
PPC OIL	& GAS COMPAN	Y, INC.						
ADDRESS	_			_				
	erprise Driv	e, Mt. Pleasa	ent, MI 48	3858				
VELL NAME		—, ···—				WELL NUMBER		
LUTZ						1-34B		
VELL LOCATIO		V= 1/ 550	~ ~	. 171	770	TOWNSHIP	COUNTY	
NV 14	NW 1/4 (Brine, Disposal, S	NE 1/2 SEC	. 34 T	17N	R. 9W	Hersey	Osceola	
	d test well	sorage, or less)			8837	FORMATION Niagaran	•	
	VG STARTED		ING COMPLET	EO	WAS PERMISSIO	ON OF DEPT OF NATURAL R	ESOURCES	
8/16/84		3/17/84			i		XX YES	O NO
		SENTATIVE WHO A	AUTHORIZED C	A SUPE	RVISED PLUGGIN	G		
Mike Moss	s							
	, 		,	.,				
CASING	WHERESET	AMOUNT	SHOT OR		TYPE OF E	BRIOGES OR PLUGS	DEPTH	NUMB
SIZE	66	None	RIPPED	1 -	ent		PLACED	SACK
24" 13-3/8"	66 860		8837	50				
9-5/8"	5430	None None		11			8700	225
3-010	J+J0	Notice	 	11			7400	100
			 	11			7050	270
		 	 				5500 5350	50 1135
	·			<u> </u>			150	65
: 1 3 3 1 N D	STAIL HOW WEL	L WAS PLUGGED						
65 sx.						(US	SE REVERSE SID	E IF NEE!
	bing, casing, etc., fore or during plu		Y	ES X	If γe	s, give details:		
	Сотрапу ритр г							
	company pum p i or set bridge plug	•	XY	ES [s, give name and address: 11 iburton		
		- ·		<u> </u>				
	olugged by a Com her than Owner o			ES X	If ye	s, give name and address:		
prosentatives	of Owner, Operator	r, Company, or Contr	actor who withe	ased bing	ging			
Marvin W	oods							
,	William E. H	lookor			IFICATE	logianl Commiscs T	n.a	
ate that Lam	authorized by s		ator to make t	his repo	rt; and that this r	<u>logical Services, I</u> eport was prepared under m ige.		nd direct
SIGNATURE	/// -	B 1/3	ADDRESS		sion Road	TITLE		
<u>. u/</u>		" Justin	Mt Plea	sart.	MI 48858	Ge o logist		
	REPRESENTATION		F	INALIN	ISPECTIONS			
ECHAIMENI	HETHESEN I ATT	, E					DATE	
EFARTMENT	HIPRESENTATIO	/ E					DATE	
= "				R -	-34		1 27.2	

DEPARTMENT OF NATURAL RESOURCES LOG OF OIL, GAS, ' POSAL OR STORAGE WELL (ACT 61)

G OF OIL, GAS, POSAL OR STORAGE WELL (A Submit in DUPL). 2 Within 30 Days after Well Completion

36186
DEEPENING PERMIT NUMBER

NAME(S) & A	DDRES	S DF OWNER(S	3) SHOWN O	1	NAME & ADDRESS OF DRILLING CONTRACTOR(S)											
Wills	net,	Inc.			ſ	T. D. Provins Drilling Company										
		rprise Dri	ve				Enter									
		ant, MI 48				Mt.	Pleasar	ιĽ,	MI 48	858						
LEASE NAME	(s) & W	ELLNUMBER	SHOWN ON	PERMIT						DIR	ECTIO	NALL	YDR	LLED	,	
Paine	a #1	l-35								YES		NO	奴			
SURFACE LO	CATIO	V	SECTION		TOWNSHIE)	RANGE			TOV	VNSHII	P NAM	E			
NE NI	N NE			35	1	7N		W		Hersey						
FOOTAGES	(1	North/South)	<u> </u>		(E:	(East/West)					COUNTY NAME					
460 F	t. from_	North L	ine and8	<u>5</u> 2	_Ft. from	West Li	ine of quar	er s	ection	Osceola						
SUBSURFAC	E LOCA	TION	SECTION		TOWNSHIE		RANGE			TOWNSHIP NAME						
FOOTAGES	- (1	Vorth/South)			(E.	ast/West)				COL	IYTAL	NAME				
F	t. from_	L	ine and		Ft. from		ine of quar	ter :	section				•			
DRILLING	G B EGU	N	TOTAL D	EPTH OF WE	LL	TYPE WELL										
11-6-	-82		Driller_83	_وما09	8307	Gas	Well				E	ELEVA	TION	s		
DRILLING	COMP	LETED	FORMATI	ON AT T.D.		FT. DRLD	ROTAF	Y	roous	К.В			R.F.	***************************************		
12-2	L-82		innatia	1	From	0 то	8	307	1	121	.5]	L 21 3			
E WELL CO.	MPLETE	D	NG FORMAT	ION(S)	FT. DR LD	-			B.T			Gra.				
2-8-			1	t Bluff		From	•				•			L191		
<u> </u>	· · · · · · · · · · · · · · · · · · ·		<u>!</u> _													
•	CASING	, CASING LINE	RS AND CE	MENTING			•		PERFO	BATI	2MC					
SIZE	W	ERE SET	CEM	CEMENT Ft. Pulled			MIMEE							OPEN		
24"		56'		P		DATE	NUMBER INTE			RVALI	PERFO	HATE	D.	YES	NO	
13 3/8"		852'	775			1-15-8	3 2x/	F+	911	5 _	8117	,		XX	1	
9 5/8"		5530'	2400			1-15-8		_	8077					XX	 	
	5 1/2" 8308'					1-13-0				-810		07,		<u>v</u>	\vdash	
<u> </u>		3308	1100	ox					-010					 -		
					<u> </u>	<u> </u>									<u> </u>	
	GRO	OSS PAY INTE	RVALS			ALL OTHE	B OIL AN	o G	AS SHOWS	OBSE	RVFD	ORI	OGGE	D		
			1		a					7						
FORMA		OIL OR GAS				MATION OR GAS DEPTH			Sam-	10424	Pits	Mud	Gas	Fill		
Burnt B	Lufi	Gas	8076	8118	[ples	1030.	 	Line	Log.	Up	
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<u> </u>		 	ļ		Sour Zo		Gas	-+	4710	+		┼	 	X	 	
L		<u> </u>	<u> </u>		Manitou	llin	Gas		8240		<u> </u>	<u> </u>	<u> </u>	X	<u> </u>	
	STIMUL	ATION BY AC	ID OR FRA	CTURING		WAT	ER FILL L	וליםו	E 21 1 1 1 1 1	OST (18611	ΑΤΙΩ	N (I C	. 1 (2)		
DATE		val Treated	Materia	is and amoun	t used		ATION		.U. L.C.	UE,	- I A	├──	AMU	UNT		
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Schlumberger		XX Sonic		200 - 8	3307				3200	$\perp 1/$	2°	<u> </u>	<u> </u>			
Birdwell		LDT-CN		200 -					3800		12°	<u> </u>		_ _		
¥		DLL-ML1	<u> </u>	-3300- 8					<u> 5850</u>		1/2°					
McCull	<u>. </u>	XX Bond Lo	og	1				[7032	2	1/4°	1			· -	
				P	RODUCTION	TEST DAT	Г Д							:	_	
OIL - Bbis/	day Gr	AAVITY - PAP	COND.	Bbls/day G	AS - MCF/c		R - Bbis/d	aγŀ	1 ₂ S – Grai	ns/100	cu. It.			D DEF	ŤH ~	
					3000	_ 2	Bbls					470	2-80)97		
				······································											•	
		FOR THIS DE	PORT. THE	INFORMAT	ION IS CON	PLETE AN	D CORRE	CT.	•							
DATE	NAME AND TITLE (PRINT) 2-21-83 William E. Booker, Geologie						SIGNAT	អូគូរ	E//// •		0		۲_			
2-21-	03	Willia	am E. Bo	oker, G	eologist	B - 40 .	1_14	1	llem		<u> 15 c</u>	אימינ	<u></u>			

LOG OF OIL, GAS, DISPOSAL OR STORAGE WELL (ACT 61)
Submit in DUPLICATE Within 30 Days after Well Completion

31	Б.	3.	5	5

DEEPENING PERMIT NUMBER

NAME(S) & A	DDDE	22.01	CHAICDI		NAME & AD	DRESS OF	DBUIL	NG C	ONTO	ACTO	P(C)	900		2 /			
Willme			OWNER	S) SHOWN O	NPERMIT			Provi		-							
			se Driv	e				Enterp									
			MI 488					Pleasant									
LEASE NAMI	(S) & 1	WELL	NUMBER		PERMIT						DIRE	CTIO		Y DRI	LLED		
SURFACE L		-		SECTION		TOWNSHI	,	RANGE	-		TOWNSHIP NAME						
NE NW				1	35	17N		91	A .		Hersey						
FOOTAGES		(Nor	th/South)			, (E	sst/West)				COUNTY NAME						
460 F	t. from	1	North	Line and	354	_Ft. from	West_Lir	e of quarter	section		Osceola						
SUBSURFAC	E LOC	ATIC	N	SECTION		TOWNSHII		RANGE			TOWNSHIP NAME						
FOOTAGES			th/South)	Line and		-	əst/West)		COU	NTYN	AME						
DRILLIN					EPTH OF WE		TYPE WELL										
D 1-2	-83				3310 Log		Temp. Aband.					E	LEVA	TION	S		
DRILLIN	з сом	PLET	ED	FORMATI	ON AT T.D.		FT. DRLD ROTARY TOOLS				K.B.			R.F.	-		
T	8-83				ncinnati		From0			_		L236			235		
WELL CO	MPLET	ED		Non	NG FORMAT 1e	10N(S)	FT. DRLD.	_	R.T.			Grd.	213				
	CASIN	G, CA	SING LIN	ERS AND CE	MENTING			RFOR	OITA	NS				*9			
SIZE	W	HER	E SET	CEM	ENT	Ft. Pulled		NUMBE	B						OP	EN	
24"		7:			D.P.		DATE HOLES INTER				AL P	ERFO	RATE	D	YES	NO	
11 3/4"		95	4	5.5	50 Sx		NONE										
8 5/8"	8 5/8" 5540 1110 Sx																
							0, is	-									
FORMA NO		_	PAY INTE	-	E no	in refer	el is Fed a Lock	ND ND	DEPT	н				ERVE Mud Line	Gas Log.	Fill	
		+			4	Table.	1 beck	-	170					-	X	-	
		-		-		00,490	di mori	Coo	410					-	X	-	
						to 00		Gas	1								
				CID OR FRA	CTORING		WATER FILE OF (P.O.) OR LOST CIRCOLATION (E.C.							(X) (X)	_		
DATE	inte	ervai	Freated	Materia	is and amoun	t used			P.O. C		DEF	-		AIVIO	ONT	-	
NONE							NONE		1								
								-		-			-				
					1												
	MECH	ANIC	AL LOGS,	LIST EACH	TYPE RUN		DEPTH CO	RRECTION	DEVI	ATIO	N SUI	RVEY	PL	UGGE	D BA	CK	
Brand		(x)	LOG	TYPES	LOGGED II	NTERVALS	DEPTH	CORRECT	RUN	AT	DEG	REES	YES	NO	DE	PTH	
Schlumberger		XX	LDT-CN	L-GR	200	- 8313			2500	0		0°					
Birdwell			Sonic		200	- 8313			510			1°					
DLL-MLL . 3300 - 831					- 8313			6500		_	0°		-				
Ä									6900	0	3/	4°	1				
					DE	ROBUCTION	TEST DAT	A									
OIL Bbis	day 10	SRAN	IITY - OA	PI COND.		AS - MCF/		R - Bbis/da	Jule - I	Genin	e/100 i	eu ft	BH	P. AN	D DE	PTH	
				COND.	3,3,43,	- WO!			123	J. 4111							
AM RESPO	NSIBLI	E FO	R THIS RE	PORT. THE	INFORMAT	ION IS CON	PLETE ANI							2			
2-21-	02		NAME AN	o TITLE (PF	Booker,	Geologis	st B-41	SIGNATA	RE		/	Bo	ol	2			

2-21-83

DEPARTMENT OF NATURAL RESCURCES GE

GICAL SURVEY DIVISION

WELL PLUGGING RECORD

(Submit in TRIPLICATE Within 30 Days After Plugging is Completed)

PERMIT NUMBER 36355 FIELD NAME

) Enterprise	Drive, Mt	. P1	easant, MI 4	8858		
State-H	SE OR FARM NAM ersey	AE(S)						WELL NUMBER
WELL LOCATION	N					TOWN	SHIP	COUNTY
NE ¼	NW ¼	SW % SEC.	35 T.	17N	R. 9W	He	rsey	Osceola
TYPE OF WELL	Oil, Gas, Ory Hole,	etc.)			TOTAL DEPTH	FORM	ATION	
Dry Hole					8313	\ <u>C</u>	incinnatian	
DATE PLUGGING		DATE PLUGGIN			DEPT. REPRESENTA PLUGGING Sni		WHO ISSUED PERM	MIT OR WITNESSED
	CASING	RECORD					BRIDGES OR PLU	
SIZE CASING	OEPTH SET	AMOUNT RECOVERED	SHOT O		TYPE (Brush, S Coment, Mechani		DEPTH PLACED	SACKS OF CER
24"	721		 	$\overline{}$	Cement		7909-8310	120 Sx
11 3/4"	954'	 	 		Cement		6850-7909	120 Sx
8 5/8"	5540'	 	 		Cement		6650-6850	60 Sx
	3340	<u> </u>	 		Cement		5500-6650	145 Sx
					CEMETIL	······································	0000-000-0	143 2X
Were tools, tubi	ng, casing, etc., l	ost or left			If yes, giv	e details:		
n the hole befo	re or during plug	ging? 	YES	XXV)		.,	
	ompany pump m set bridge plugs?		₹XÎ YES	Пи		e name a well	nd address:	
			TX1 152					
	igged by a Comp er than Owner or		YES	XX N		e name a	nd address:	
Representatives plugging:	of Owner, Opera	tor, Company, or	Contractor w	ho witr	nessed <u>Marvi</u>	n Wood	S	
	TAIL HOW WELL							
					led drill pip			
pulled 145 sx		to 6850_and	spotted (O SX	, pulled dril	l pipe	to 6650 and	spotted
			-					
						-		
							IUSE REVER	SESIDE IF NEEDE
			C	ERTIF	ICATION			
	m authorized by	said Owner or Ope	erator to make	e this re	port; and that this	report w vledge.''	as prepared under	my supervision an
"I state that I ar	ne facts stated he	rein are true, corre	set and combi	-				
tion, and that th	ne facts stated he	di	ect and comp		(NAME AND ADD	
tion, and that th	ne facts stated he	di		DATE (I	S S	trickl	er Geologica	al Services,

2. Plugging and Abandonment Records for the State-Hersey 2-35 well:

The State-Hersey 2-35 well was temporarily abandoned and plugged back to 5500 feet on January 29, 1983. The P&A report for this work was previously submitted. This initial plug completely isolated the well from the Class III injection horizon at approximately 7500 feet.

Our records indicate the well was plugged back to surface and capped on August 28, 1984. To this point we have been unable to locate the official DNR P&A report. We have, however, included the cementing company's (Halliburton Services) job log and invoice for the plugging work.



FILE GOP

JOHN ENGLER, Governor DEPARTMENT OF NATURAL RESOURCES

DAYID F HALTS, OREGION

CARLETAC DESCRICT DESCRICT BOID Wardcings The [] Codiller, Michigen #9601

January 10, 160

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" the plant site

LONG GIVISION

4. (1. Ref.)

Acien D. Brady

Environmental Quality Analyst

616-775-9727

BDB/jkw

oc: Dan Darmer /file

Ian Halbetsen, GSD PROTECTING MICHIGAN'S FUTURE"

Distribution:

Original - District File

Caracy - Ragional Supervisor.

Sma - Cine

ADD ADDITIONAL SHEETS AS NECESSARY

UUU 217 / 4

Michigan Department of Natural Resources ENVIRONMENTAL RESPONSE DIVISION

received

APR 1 5 1992

Fax Transmittal



UIC SECTION V

NAME: PATRICK

TODAY'S DATE: 4-14-92

PLEASE DELIVER TO:

The state of the s
COMPANY/DIVISION. EPA REGION I
TELEPHONE NUMBER: 3/2-886-4/246
FAX NUMBER: 3/2-886-0957
,
SENT BY:
HAME: BRIAN BRADY
HITT/PITCH: ECO CADILLAC
-HOME MUMBER: 414-775-9727

NOTE:

your collect person for Kalium Chemical in all Review of
MDNR Biological Survey Division in Fancing (517) 334-6957.

Usin sending info pertaining to my last site visit. Ingged
if you have additional question & - call al at # above
on Mike Moss at (614) 775-9727



Kalium Chemicals P.O. Box 333, 11461 South 135th Avenue
Hersey, Michigan 49639 Telephone: (616) 832-3755 Fax: (616) 832-3349

May 20, 1991

Mr. Brian Brady Environmental Quality Analyst Dept. of Natural Resources Cadillac District Office 8015 Mackinaw Trail Cadillac, MI 49601

Dear Mr. Brady:

Enclosed is a copy of the laboratory report relating to the minor spill of corrosion inhibitor (KW-100, Petrolite) at the Kalium Chemicals plant site in Hersey, Michigan. As I noted in our phone conversation on May 17, 1991 the laboratory doing the analysis exceeded the allowable limit by three hours. I agree that this analysis is more representative of the clean up, even though it exceeded the allowable holding time, than a sample taken at this point in time would be due to the spring runoff, atc.

The contaminated soil is being stored in a steel tank which is sitting on an asphalt pad near the Solution Feed Plant. This material as well as other material will be properly disposed of during the coming fiscal year.

If you have any further questions, please feel free to contact me at the plant.

Sincefely.

Michael J. Mitchell Plant Chemist Kalium Chemicals, Ltd. 616-832-3755



MARCH 14, 1991
No. 16, Vol. VIII
PRINTED ON 100% RECYCYLED PAPER

P.O. BUR 212 HÉRSEY, MI 49635

DIFFERENCE

MI 49638 . (616) 832-4789

DON'T BUT OFF RECYCLING -- START TODAY. IF WE ALL DO A LITTLE, WE CAN MAKE A BIG

"Nobody made a greater mistake than one who did nothing because one could only do a little." — Edmund Burke

"LOCAL MONITORING" REVISITED

Back in September of 1985, after months of tedious negotiation with the Millian Environmental Review Board (MERB), the DNR and PPG (now Kalium Chemicals), GROUNDWATER succeeded in getting the MERB to adopt a series of cocommendations covering PPG's Michigan Potash Project. Those recommendations were circulated to GROUNDWATER's membership at that time. Since the MERB's recommendations were merely "advisory", however, formalizing new into a legally binding "consent agreement" to be signed by PPG, was left to the then newly formed DNR Office of Litigation and Program Durvices.

It appears that in reducing the MERB's recommendations to a consent agreement, the DNR, for reasons as yet unknown, undid much of GROUNDWATER's work. The MERB's "local monitoring" recommendations, watered down as they were, nonetheless would have required the industry to provide to local libraries, at PPC's expense, quarterly reports of their operations, clean-up and monitoring activities. Somehow, these provisions never found their way into any of the numerous draft agreements prepared by the DNR.

As if this gaffe weren't bad enough, the final draft consent agreement was never signed by PPG! Contained in that unsigned draft were the remaining cafeguards GROUNDMATER fought so hard to assure: no toxics disposal, replacement of water wells, etc. Meanwhile, permits were issued, PPG began operations and in 1987, sold its interests to Kalium. As a result of these circumstances, PPG's promises to the MERB, GROUNDWATER and to local cesidents are unenforceable against PPG, Kalium or anyone else.

Whether through bengling or a willful breach of faith, the DNR has sabotaged this community's effort to gain a measure of local control over the future of its environment. And they wonder why we don't trust them!



OXECLA

Kalium Chemicals P.O. Box 333, 11461 South 135th Avenue
Hersey, Michigan 49639 Telephone: (616) 832-3755 Fax: (616) 832-3349

March 6, 1991

Mr Brian D. Brady brylronmental Quality Analyst Dept. of Natural Resources CADICIAC DISTRICT OFFICE DOIN Mackinaw Trail Certiciac, MI 49601

Desc Mr. Brady:

The writing to inform you that we have been unable to obtain a proper sample due to frozen ground. The site of the optil has not been covered by additional fill and is therefore frozen

A sample will be collected as soon as the ground thaws and will be combyred for 1,4 Dioxane. The analytical results will be deriveded to you as soon as they are available.

of you have any questions, please contact me at the number below

Singerely,

Michael Mitchell Plant Chemist (616)-832-3755

* 40 20-100			NVIRONMEP:TAL P		Total Control of the	FRER		
4		PERM	UND INJECT	ATION	da	n e e e		T/A
UIC		(Collected under Water Act. S	er the authori <mark>ty of</mark> Sections 1421, 142	the Safe Drinking 2, 40 CFR 144)	9			
			ATTACHED INSTRU		STARTING	m - Addition		
Application approved mo day year	Date Received mo day year	Permit/V	Vell Number		Con	nments	No.	.0
		MI-1:	33-3G-	4002				14
II. FACILITY NAME	E AND ADDRESS		V: "	III. OWNER/C	PERATOR AND ADD	RESS		
Facility Name He	rsey Potash	Facility		Owner/Opera Kalaum Cl	ator Name nemicals, Ltd			
Street Address	135th Avenue			Street Address Suite 100	D, The East T	ower; a	2550 Golf	Road
City Hersey		State	ZIP Code 49639	City Rolling!	Meadows, IL		State ZIP C	ode 8-405:
IV. OWNERSHIP	STATUS (Mark 'x')	And the second		V. SIC CODES		J		1
A. Federal	☐ B. State	C. Private		1474				
	E. Other (Explain	7)			. ,			<u> </u>
VI. WELL STATUS			2 Halles					A-250
CIA.	Date Started	N B Modifica	tion/Conversion	C. Proposed				
Operating	mo day year	a. iviodinear	1017 60114131011	1	Attached Note	s 1		
1 Should Manager Street	MIT REQUESTED (A	Azek 'v' and enoni	h if required	366	Accuence no ce			
		Number of Exist		Name(s) of fiel	d(s) or project(s)	Example Section		
A. Individual	□ B. Area	ing wells	posed wells See Note 2		otash Project	5		
VIII. CLASS AND	TYPE OF WELL (see	reverse)	*	7-1-7-7			and the state of	
A. Class(es)	B. Type(s)	C. If class is "ot	her" or type is cod	e 'x,' explain			e (if area permit)
(enter code(s))	(enter code(s))				10 by end			
111	G				20 within	пехс	TO AGOLZ	
IX. LOCATION OF	WELL(S) OR APPR	OXIMATE CENTE	R OF FIELD OR PE	ROJECT	X. II	NDIAN LAN	DS (Mark 'x')	de la company
A. Latitude	B. Longitude					7 ~	₩	
Deg Min Se	ec Deg Min S	ec Twsp Range 17N 9W	Sec 1/4 Sec Fee	from Line Fe	et from Line L	Yes X	M No	
XI. ATTACHMENT	S	-/N JW	7.00			H.Xata		ol co
		uestions on a	senarate cheet	(s) and number	r accordingly; se	e instruc	tions)	
					arate sheet(s) Att			-61 22
					which are appli			
your applic								
XII. CERTIFICATION	ON S	te sa		The Late of		THE STATE OF	Sell rolls	
		nalty of las	withat I have	nersonally	examined an	d am fa	miliar with	the
					ents and that,			
					the information			
					hat there are s			
					fine and impr			
144.32)		,		,				
A. Name and Title	a (Type or Print)			<u> </u>		8. Phon	e No. (Area Code	and No
	. Metzger, R	esident Ma	nager			i	-832-3755	G110 /11).
C. Signature				// // // // // // // // // // // // //		D. Date	Signad	
	pl MI	-				1)-21-9	1 1
Maal	00//	alyger				1 10	1-21-4	

Lease	PF	^P G		Well	1011	· ·	Date _	11-16-84	i
Size C	asing	7"	Set	ting Depth	7582		Top (li	ner hanger)	
Hole S	Gize	8½ " Mud	Gradient			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Viscosit		
Casing	Equipment								
Diff	. fill	S	noe, <u>diff</u>	. fill		_ float locat	ed	107	feet
a bove	shoe,			DV colla	rs located at			<u> </u>	feet
and			feet.						
	3	3							÷;
			- 						
Liner		oack off (describe)							
Miscel		<ets, etc.)<="" td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td></ets,>							
Cemer	nt (around sł								
	No. <u>Sacks</u>	Brand	Туре		Additiv	<u>res</u>		Slurry Weight	Slurry Volume
(1)	400	HOWCO Lite	A	Salt	Sat.	——————————————————————————————————————		14.1	117
(2)	425	Reg. Poz.	A	Salt	Sat. ¼#/sac	k D-Air		14.7	104
(3) Cemer	175 nt through D	Class V Collar at	H fe		alt, ¼#/sac	k D-Air		16.7	34
	No. Sacks	Brand	Туре		<u>Additiv</u>	es		Slurry <u>Weight</u>	Slurry Volume
(3)						·			
(4)									

Cementing Procedure (around shoe) (cross out where necessary)	
Circulated 60 minutes, pumped in 49 (cu. ft.), (barrels)	
prewash, used bottom plug (yes, no), mixed cement (XXXXXXX) and 3	
minutes, cement (2) above minutes, top plug (yes, no) displaced	with
294 (cu. ft.), (barrels) in 50 minutes at rate of 6 BPM, (СFM,
(<u>Bumped plug</u>) (Did not bump plug). Final Pressure 2,000	cated
pipe feet while (mixing) and (displacing) cement. Displacing time	
minutes. Had circulation (full, pa	rtial,
none, etc.). Completed job at22:51a,m., p.m.	
Cementing Procedure (through DV at feet) (cross out where necessary)	
Opened DV at a.m., p.m., circulated minutes, pumpe	d in
(cu. ft.), (barrels) prewash, mixed cement (3) a	
minutes, cement (4) above minutes, dropped closing plug,	dis-
placed with (cu.ft.), (barrels) in minutes at rate of	
BPM, CFM. (Bumped plug) (Did not bump plug). Final Pressure	
Displacing time minutes. Had circula	
(full, partial, none, etc.)	
Remarks (Third Stage Job, etc.)	
Plug landed and float held, had mud flush return to surface, no cement.	
Marvin Wood	

Foreman

STATE OF MICHIGAN

REQUEST FOR	TRANSFER OF PERMIT	PERMIT NO	WELL TYPE
		347-845-767	Solution Mining
BMIT 4 COPIES TO:	Department of Natural Resources Geological Survey Division Box 30028	FIELD NAME	and or that William
	Lansing, Michigan 48909	WELL NAME AND NUMBER	
, P.A. 1939 and Act 315 F	of well is required in accordance with DAct P.A. 1969, as amended, and Administrative	Kalium 1012 (formerly Thomas 3-26)
les promulgated thereunder.		SE -1/4 NW 1/4 NW	1/4 SECTION 26 1 17N 8 9W
		1()WNSHIP	COUNTY
	R OF A PERMIT FROM:	Hersey	Osceola
VAME(S) OF SELLING OWNER(S) PPG Industries	I. Inc.		
ADDRESS Number and Street — C	City or Town — State - Zip Code - Telephone		
One PPG Place		1412	1 434-2841
Monstelling highle are discharged to Owner(a)	DV. Pleproseπισείνο(s)	·Signiture(s)	Date(s;
0111014	(All Oscillot and Al		1 1
PPG Industries	, Inc. R.J. Samelson	A SA	191010 9/6/08
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	IS CONDITIONED UPON COMPLIANCE WIT		AND ORDERS OF THE DEPARTMENT OF
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16014-2014119316		24 111200110 1	AFO BARNOW MICHISONABIEM.
NAME(S) OF ACQUIRING OWNER(S)	TRANSFER OF	A PERMIT IU:	
	Sity or Town State 2n Code Telephone	- 1000 HM - 54-46	nne.
	10th Avenue Hersey MT	10630	161 832-3206
	vell under this permit and assume full respons		
Carlon was a second to	ADIC MEN APPARIES BANGIO	A AA	
		G CO	
370			
	sponsibilities are assumed by		
Owner(s)	Representative(s)	Signature(Date(s)
Kalium Chemica	als, Ltd. Donald D. Metz	nor Mauselli	VIII. 9-19-28
10 days are all departs to the part of the contract of the con	and along a wallend by a life to a	MET NOS	
Y			<i>₽</i> •
	9 Although de la company de la	1	332230111
774-1	The second secon		
		Andrew	April 1990
	FOR DEPARTMENT OF NATU	RAL RESOURCES USE ONLY	,
			DISTRIBUTION BY DNR
			Q Lansing
2-1-70	00///	1 / 1	Acquiring Owner
APPROVED Allefon	Jagge Signature	10/17/18/19/19/19/19/19/19/19/19/19/19/19/19/19/	□ Selling Owner □ Field

STATE OF MICHIGAN EPARTMENT OF NATURAL RESOURCES GEOLOGICAL SURVEY DIVISION

M'MERAL WELL COMPLETION REPORT TO FILED WITH THE SUPERVISOR WITHIN 60 D AFTER COMPLETION OF WELL (ACT 315, P.A. 1969)

SUBMIT IN TRIPLICATE

				A	FIER	COMP	LETION OF	WELL (A	CI 3	15, P.A. 196	9)					
DF (OWNER O	R OPER	ATOR					ADDR	ESS C	F OWNER	OR OPERA	TOR	 -			
PPG IND	USTRIE	s, INC	c.							erprise sant, M		}				
NAME OF	DRILLING	CONTR	ACTOR					ADDR	ESS C	F DRILLIN	IG CONTRA	CTOF	1			
INDRIL,	INC.							PO Box 668 Mt. Pleasant, MI 48858								
VELL NAM	E	<u></u>						WELL	NOW	BER	PERMIT N	UMB	ĒR			
THOMAS	<u></u>			#	101	2		3-26			042-84	1-36	57			
SE'S NW	NW1						_	SECTION TWP. RANGE								
COWNSHIP	1111-2							CDUNTY								
Hersey																
OOTAGE	929		Ft. from	No.	-th		Line and	650		Ft. from	Wes			ine of qua	actor.	rantia-
TATE DRIL	N or S ATE DRILLING COMMENCED DATE DRILLING COMPLETED									. CDMPLET	E	r W	PE OF V		arter:	section
	11/19/84 01/04/85							1	/07		20	!		II (D-	5)	
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				The inform	ation is	n and	attached to	this report	is co	mplete and	correct.		-,	-		
GNATURI	= , <i>I</i> ;				1		TITLE							DATE		
_Wi	llin	<u>'</u> سید	E 1	Brol	Cen	·	Geolog	gist						01/21/	′85 	
				GIVE (DMPLI		ORMATID N	RECDAD	ON F	REVERSE S	IDE					

STATE OF MICHIGAN
EPARTMENT OF NATURAL RESOURCES
GEOLOGICAL SURVEY DIVISION

"INERAL WELL COMPLETION REP RT 3E FILED WITH THE SUPERVISOR WITHIN ()AYS AFTER COMPLETION OF WELL (ACT 315, P.A. 1969)

SUBMIT IN TRIPLICATE

05	OWNER C	D OPERA	TOP					ADDR	ESS OF CIAINED	00 0050	ATOR				
OF OWNER OR OPERATOR									ESS OF OWNER		AIOH				
PPG IND	USTRIE	S, INC	o						Enterprise Pleasant, M		8				
NAME OF I	DRILLING	CONTRA	ACTOR					ADDRI	ESS OF DRILLI	NG CONTR	ACTOF	1			
								PO Bo	ox 668						
INDRIL,									Pleasant, M	II 4885	8		9		
WELL NAM	٤			#	101	2	-	3-26	NUMBER	042-8					
LOCATION								SECTIO	5N	TWP.	11 3	7	RANGE		
SEL NW	NW ¹ 4							26		17N			9W	-	
Township Hersey								Osceo							
FOOTAGE	929		Ft. fro	m Nor	th	Line	and _	650	Ft. from	n We	st or W	Lir	ne of qu	arter sec	tion
DATE DRIL		MENCED		DATE DRIL	LING	COMPLETE	D	DATE	WELL COMPLET			PE OF W	ELL		
11/19/8	4			(01/04/8	35			1	/07/85		Tes	st Wel	1 (D-	5)	
FORMATION Niagara		ETED IN		7825 Dr		30 Log		ELEVATI	ON KB 1162.1	RB	RT		RF 1160.	7 GN	145.6
ROTARY TO								CABLE	TOOLS						
From	0		Feet	to 78	330		Feet	From		F	eet to				Feet
						WELL	CASIN	IG RECO	ORD	· · · · · ·					
	UBING A							NG DATA				TIONS		N HOLE	
SIZE	LB./FT.		DE	350°	SAC	c. 100	YPE		NG DEPTH(S)	NO. HO	LES	FR	MOM	1	ТО
13-3/8"			0	906'		sacks			Ommon					-	
9-5/8"				5455'					nd stage 3	63/1-cur	face	100	CIA	800 1:	icht
7"	23#			7590 1			75 C1		orașe y	- J4 J41	race	100	OIR,		
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FORMA		FROM	ТО	AMOU	NI		CE CON		TYPE LOC			/AL LOG	GED		YTO
	(Fresh)					Schlum		r	LDT-CNL-G		3200-	7830			X X
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									L					1	
FRA	CTURE	OR ACI	D TR	EATMENT					SOLUT	ION MINI	NG			1	
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	-			-											
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1100	-			The inform	ation ii			his report	is complete and	correct.					
IGNATURE					1		LE						DATE		
Wi	llian	<u> </u>	5	15,001	Cen	Ge	eolog	ist					01/21,	/85	
				GIVE	OMPL	ETE FORM	ATION	RECORD	ON REVERSE	SIDE					

Lease	PPG	We	10	012	Date	11-26-	-84
Size Casing	13 3/8"						
Hole Size _		Mud Gradient			Viscosi	ту	
Casing Equi	pment						*
Guide		shoe,ma	inual	float	located	4() feet
above shoe,		D	V collars loc	ated at			feet
and		feet.					
		centralizers l	ocated				
		·		 			
Miscellaneou	r and pack off (descrus (baskets, etc.)						
	o.	-		Astro		Slurry	Slurry
7.5	cks Brand O HOWCO	<u>Type</u> Lite	3% Ca(Additives C1 4#/sack F1	ocele	Weight	Volume
(1) $\frac{75}{20}$		A	3% Ca				
	ough DV Collar at _	feet					
N Sac	o.	Туре		Additives		Slurry Weight	Slurry Volume
(3)			<u>.</u>				
(4)			···				

Cementing Procedure (a	around shoe) (cross out where necessar	y)	
Circulated3	0 minutes, pumped in 10	0(cu. ft.),	(barrels)
	prewash, used bottom plug (yes	, <u>no)</u> , mixed cement (1)	above27
minutes, cement (2)	above9	minutes, top	plug (<u>yes</u> , ∩o) displaced with
135(cu	u. ft.), (<u>barrels)</u> in27	_ minutes at rate of	5BPM, CFM.
(<u>Bumped plug</u>) (Did	not bump plug). Final Pressure	135	
pipe	feet while (mixing) and (displac	ing) cement. Displacing	time27
minutes. Had			circulation (full, partial,
none, etc.). Complete	d job at a	.m., p.m.	·
Cementing Procedure (t	hrough DV at feet) (cross	s out where necessary)	
Opened DV at	a.m., p.m., circu	ulated	minutes, pumped in
	(cu. ft.), (barrels)		
	minutes, cement (4) above		
	(cu. ft.), (barrels) in		
	CFM. (Bumped plug) (Did not bu		
	minutes. Had		
(full, partial, none, et			Circulation
Remarks (Third Stage . Had 35 barrels	cement return to surface		
		<u></u>	Marvin Wood
			Foreman

Leas	e PPC			Well	1012	Dat	e <u>12-18-</u>	84
Size	Casing	5/8"	Set	ting Depth	5455	Тор) (liner hanger) _	
Hole	Size12	<u>"-</u> " Mu	ıd Gradient			Visc	cosity	
	ng Equipment							•
Aut	to fill		shoe, auto	fill		float located	40	feet
						3634		
	,							
					overv et	hor ising abo	ura ab-a	
-	8		centralizer	s located	every or	her joing abo	ve snoe	
			scratchers	ocated				
					•			
Line	r hanger and pac	k off (describe	e)				- 	
Misc	ellaneous (basket	rs, etc.)						
Cem	ent (around sho							
Join	No.	- 1					Ø1	01
	Sacks	Brand	Type		Additiv	es	Slurry <u>Weight</u>	Slurry Volume
(1)	600	HOMCO	Lite	3% (CaCl		13.6	210
(2)	200	Comm.	A			PA	15.6	42
Cem	ent through DV	Collar at	fe	et				
	No.						Slurry	Slurry
	Sacks	Brand	Туре		Additiv	es	Weight	Volume
(3)	800	HOWCO	Lite	3% Ca(21		13.6	280
(4)	100	Comm.	A	3% Ca(21		15.6	21

Cementing Procedure (around shoe) (cross out wh	ere necessary)		
Circulated 90 minutes, pumped	d in15	(cu. ft.), (barrels)	
prewash, used bottor	n plug (yes, <u>no)</u> , mix	ed cement (1) above _	31
minutes, cement (2) above5		_ minutes, top plug (<u>y</u>	es, no) displaced with
(cu. ft.), (barrels) in	minutes	at rate of4	BPM, CFM.
(Bumped plug) (Did not bump plug). Final P	ressure1	.000	Reciprocated
pipe feet while (mixing) a	and (displacing) cemen	t. Displacing time	79
minutes. Had			circulation (<u>full</u> , partial,
none, etc.). Completed job at11:38	<u>a,m</u> ., p.m.		
Cementing Procedure (through DV at3634	feet) (cross out where	necessary)	
Opened DV at 12:21 a.m.	p.m., circulated	7	_ minutes, pumped in
	and the state of t	prewash, mi	xed cement (3) above
32 minutes, cement (4) ab	ove3	minutes, drol	pped closing plug, dis-
placed with 271 (cu.ft.), (barrels)	in56	minutes at rate	of5
BPM, CFM. (Bumped plug)	(Did not bump plug).	Final Pressure	2,000
Displacing time56 minutes. Had	***************************************		circulation
(full, partial, none, etc.)			
Remarks (Third Stage Job, etc.)			
		Marvin Wo	
		Forema	ะก

Lease	PPG			Well	1012	· ·	Date	1-5-85	
Size Casing	7"			Setting Depth	7580		Тор	(liner hanger) _	
Hole Size _	8 ¹ 2		Gradien:	t	1.00 %		Visco	sity	
Casing Equip	pment								
Auto fil	1	sl	hoe,	auto fill		float locat	ed	41	feet
above shoe,				DV collars	located at				feet
and			feet.						
	8		_ centra	lizers l ocate d _	middle	1st 8 joint	s		
			_ s c rat c l	ners located	· · · · · · · · · · · · · · · · · · ·				
									
Cement (arc								•	
	lo. <u>cks</u>	Brand	Type		Addi	tives		Slurry Weight	Slurry <u>Volume</u>
(1)95	50	50/50	A	Salt	Saturate	d	· · · · · · · · · · · · · · · · · · ·	14.7	231
(2)	75 1	HOWCO	H	5% KG	Cl, 1% Ha	lad 322		16.4	33
Cement thro	ough DV Coi	lar at		_ feet					
N Sac	o. eks	Brand	Type		Addi	tives		Slurry Weight	Slurry Volume
(3)									
(4)									

Cementing Procedure (around shoe) (cross out where necessary)	
Circulated minutes, pumped in (cu. ft.), (barrels)	
prewash, used bottom plug (<u>yes</u> , no), mixed cement (1) above37	
minutes, cement (2) above	vith
297 (cu. ft.), (barrels) in 53 minutes at rate of 3 BPM, Cl	
(Bumped plug) (Did not bump plug). Final Pressure	ited
pipe feet while (mixing) and (displacing) cement. Displacing time53	
minutes. Had circulation (full) par	tial,
none, etc.). Completed job at03:24a.m., p.m.	
Cementing Procedure (through DV at feet) (cross out where necessary)	
Opened DV at a.m., p.m., circulated minutes, pumped	in
(cu. ft.), (barrels) prewash, mixed cement (3) ab	ove
minutes, cement (4) above minutes, dropped closing plug,	dis-
placed with (cu.ft.), (barrels) in minutes at rate of	
BPM, CFM. (Bumped plug) (Did not bump plug). Final Pressure	_
Displacing time minutes. Had circulat	ion
(full, partial, none, etc.)	
Remarks (Third Stage Job, etc.)	
Circulate 50 barrels cement to surface	
Marvin Wood	

Foreman

 $\{ 1, \dots, n \} = \{ 1, \dots, n \} \cup \{ 1, \dots, n \}$

STATE OF MICHIGAN	(YPE OR PRINT					
REQUEST FOR TRANSFER OF A PERMIT	PERMIT NO	WELL TYPE					
SUBMIT 4 COPIES TO: Department of Natural Resources Geological Survey, Division	042-841-367 FIELD NAME	Minerals Exploration					
Box 30028 Lensing, Michigan 48909	WELL NAME AND NUMBER						
iling for change of ownership of well is required in accordance with Act 31, P.A. 1939 and Administrative		(formerly Thomas 3-26)					
Rules promulgated thereunder.	SEM NW 1/4 NW	1/4 SECTION 26 T 17N 8 9W					
	TOWNSRIP Hersey	COUNTY Osceola					
TRANSFER OF A PERMIT FROM: NAME(S) OF SELLING OWNER(S)	MCT GGY	7 L V V L V					
PPG Industries, Inc.							
ADDRESS bumber and Street — City or Town — Stere — Zin Code — Telephone							
One PPG Place Pittsburgh, PA 152 All operating rights die discharged by:	72 (412) 434-2841					
Owner(s) Owner(s) Representative(s)	Signidureisi	Detelai					
	110	1. 1 at 1. 140					
PPG Industries, Inc. R.J. Samelso	$\frac{n}{\sqrt{2}}$	Hamabon 1/6/00					
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		the state of the s					
ELIGIBILITY FOR PERMITS IS CONDITIONED UPON COMPLIANCE WIT	H THE STATUTES, RULES	AND ORDERS OF THE DEPARTMENT OF					
NATURAL RESOURCES, PERMITS WILL NOT BE GRANTED TO PERSO	ONS NOT IN COMPLIANCE						
NON-SUBMISSION AND/OR FALSIFICATION OF THIS INFOR	MATION MAY RESULT IN	FINES AND/OR IMPRISONMENT.					
TRANSFER OF	A PERMIT TO:						
NAME(S) OF ACCUIRING OWNER(S)							
Kalium Industries, Ltd. ADDRESS Number and Street City or Town State Zt. Code Telaphone							
11126 South 140th Avenue Hersey,	MI 49639	(616) 832-3206					
(We) (I) have acquired the well under this permit and assume full respons							
law, regulations and orders.							
	G CO						
BLANKET ON FILE BOND	NUMBER						
All operating rights and responsibilities are assumed by							
Owner(s) Representative(s)	Signatu	re(s) _ Date(s)					
	() () () () ()	1 /0_					
Kalium Chemicals, Donald D. Metzger	Complete Co	your 9-19-88					
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		1					
FOR DEPARTMENT OF NATU	JRAL RESOURCES USE ON	ILY					
		DISTRIBUTION BY DNR					
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son n n/	//	Acquiring Owner					
APPROVED Sefer Symphous	10/12/88	□ Selling Owner □ Field					

										JUL.	20	1330			
	STATE CO DEPARTMENT OF GEOLOGICAL D. BOX JOOZE LAI	F MICHIGAN NATURAL RESDU SURVEY DIVISION	RCES		P	PERMIT NO. DEEPENING PERMIT NO. TYPE OF WELL (ARREY CONTEXPROOF) 366-904-767 SOLUTION MINING									
RECORD O	F WELL DI	RILLING O	R DEEP	ENING	F		LID		Y POI	'ASI	I F	ACIL	ITY		,
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KCL - 1041 Casing and Cementing

- 1. 18-5/8", 87#, K-55 set at 390 ft.; cemented with 250 sxs. Lite w/ 3% CaCl and 50 sxs. class A with 3% CaCl; returns to surface.
- 2. 13-3/8", 61#, J-55 set at 920 ft.; cemented with 550 sxs. Lite w/ 3% CaCl and 200 sxs. class A with 3% CaCl; returns to surface.
- 3. 9-5/8", 40#, N-80 set @ 5260 ft.; cemented with 1900 sxs. Halco Light, 2% CaCl, 300 sxs. class A with 2% CaCl; cemented in 2 stages w/ returns to surface.
- 4. 7", 25 jts., 29#, MN-80, and 160 jts., 26#, L-80 set @7898; cemented with 960 sxs. 50/50 POZ, 2% salt sat. gel, 150 sxs. class A, 5% KCl; 1% Halad 322 plus 5#/bbl. Halco gel; returns to surface.

AAALISJOHNSON GWNEP PERATOR

EUR PHONE (616) BA1-BA92 PARI (616) B41-4624

WELL NAM	1E: KCL 104			Y DRILLING	neroni aus: <u>Besaul</u> #	re: <u>4-23-90</u> 14	
9 2 Depin	2' 300 Footage Cut	\$1	ratus:L	luiting on	out.		
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Condilion t/8 Gauge	2111	n l		Solids S	Sod® Ash	7	
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5260 DAYS: 5	Footage Cut	# 104 STATUS: ! Kime!	95/8 : Dophian	FIG:	usd #14 D.V. tool	
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Attachment I.1.A.

LITHOLOGY AND STRATIGRAPHY

Kalium 1041

(Drill depths referenced to Schlumberger LDT/CNL/GR log; Log measured from KB, 17.0 feet above ground level)

GL ELEV. 1145.9 KB ELEV. 1162.9

Log measured from K	NO LELV. 1102.9				
		,	True	True	
		Drill	Vert.	Thick	
Rock Unit	Age	Depth	Depth	-ness	Lithology
Glacial Drift	Pleistocene	0	0	640	Sand, gravel, clay
Red Beds	Jurassic	640	640	90	Shale, siltstone, gyp.
Grand River	Pennsylvanian	730	730	177	Sandstone, shale
Saginaw	Pennsylvanian	907	907	265	Shale, sandstone
Bayport	Mississippian	1172	1172	67	Limestone, sandstone
Michigan	Mississippian	1239	1239	145	Shale, sandstone
Triple Gyp.	Mississippian	1384	1384	70	Anhydrite, shale
Brown Lime	Mississippian	1454	1454	117	Dolomite, shale
Stray Sand	Mississippian	1572	1571	141	Sandstone
Marshall	Mississippian	1716	1712	127	Sandstone, shale
Coldwater	Mississippian	1847	1839	739	Shale
Sunbury	Miss/Dev.	2628	2578	93	Shale
Ellsworth	Devonian	2727	2671	410	Shale
Antrim	Devonian	3155	3081	170	Shale
Traverse Fm.	Devonian	3331	3251	45	Shale, limestone
Traverse Lm.	Devonian	3378	3296	528	Limestone
Bell Shale	Devonian	3935	3824	56	Shale
Dundee	Devonian	3993	3880	70	Limestone, dolomite
Reed City Anhyd.	Devonian	4066	3950	7	Anhydrite
Reed City Dol.	Devonian	4074	3957	159	Dolomite .
Det. Rv. Anhyd.	Devonian	4240	4116	69	Anhydrite
Det. Rv. Salt	Devonian	4312	4185	404	Salt, dolomite
Sour Zone	Devonian	4732	4589	130	Dolomite
Massive Anhyd.	Devonian	4867	4719	307	Anhydrite
Amherstberg	Devonian	5186	5026	113	Limestone
Sylvania	Devonian	5304	5139	112	Sandstone, limestone
Bois Blanc	Devonian	5421	5251	164	Limestone, dolomite
Bass Islands	Silurian	5593	5415	292	Dolomite
Salina G	Silurian	5900	5707	9	Dolomite, shale
F Unit	Silurian	5909	5716	43	Dolomite
F Salt	Silurian	5954	5759	561	Salt, shale, dolomite
E Unit	Silurian	6534	6320	120	Shale, dolomite
D Salt	Silurian	6656	6440	40	Salt
C Shale	Silurian	6697	6480	92	Shale, dolomite
B Salt	Silurian	6790	6572	377	Salt, dolomite

PAGE ONE

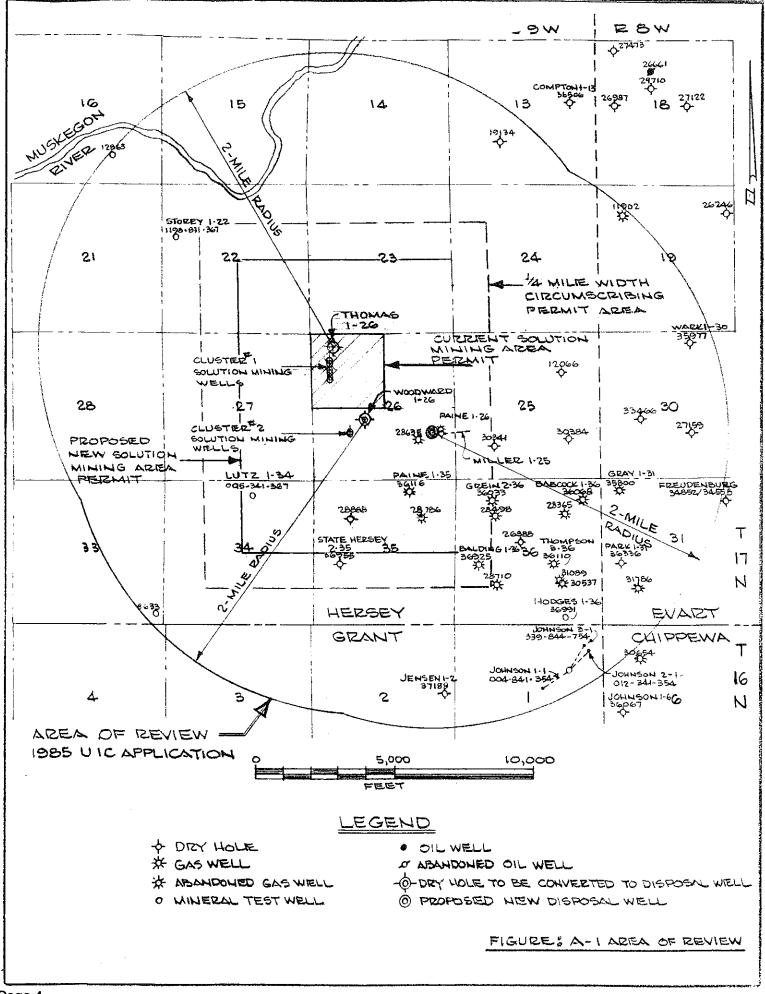
Attachment I.1.A.

LITHOLOGY AND STRATIGRAPHY

Kalium 1041

			True	True	
		Drill	Vert.	Thick	
Rock Unit	Age	Depth	Depth	-ness	Lithology
\-2 Carb	Silurian	7172	6949	141	Limestone, dolomite
1-2 Salt	Silurian	7314	7090	357	Salt
\-1 Carb	Silurian	7673	7447	55	Limestone, dolomite
4-1 Salt	Silurian	7728	7502		Salt

TOTAL DRILL DEPTH: 7950 FT. (A-1 SALT)



- 3. Original bottom hole pressure
- 4. Static water level of drinking water aquifer
- 5. Porosity
- 6. Specific gravity of fluid in injection zone

Checklist items A.1, A.2, A.3, A.5 and A.6 pertain to characteristics of the waste brine disposal zone. Solution mining of potash dissolves a cavity in a soluble but impermeable zone as discussed in Attachment N. No disposal is to be conducted in the solution mining wells covered by this UIC permit application.

Item A.4 is the static water level of the drinking water aquifer. A static water level of 58 feet below surface was reported in the 180-foot deep water supply well drilled into the glacial drift near the Thomas 2-26 well which is intended to be utilized for test facility potash solution mining.

ATTACHMENT B

MAPS OF WELLS/AREA OF REVIEW

Reference:

SOLUTION MINING PERMIT APPLICATION

U. S. POTASH SOLUTION MINING TEST FACILITY

Osceola County, Michigan, Volume I, Attachments A-D, for PPG Industries, Inc., Pittsburgh, Pennsylvania, by Fenix & Scisson, Inc., Tulsa,

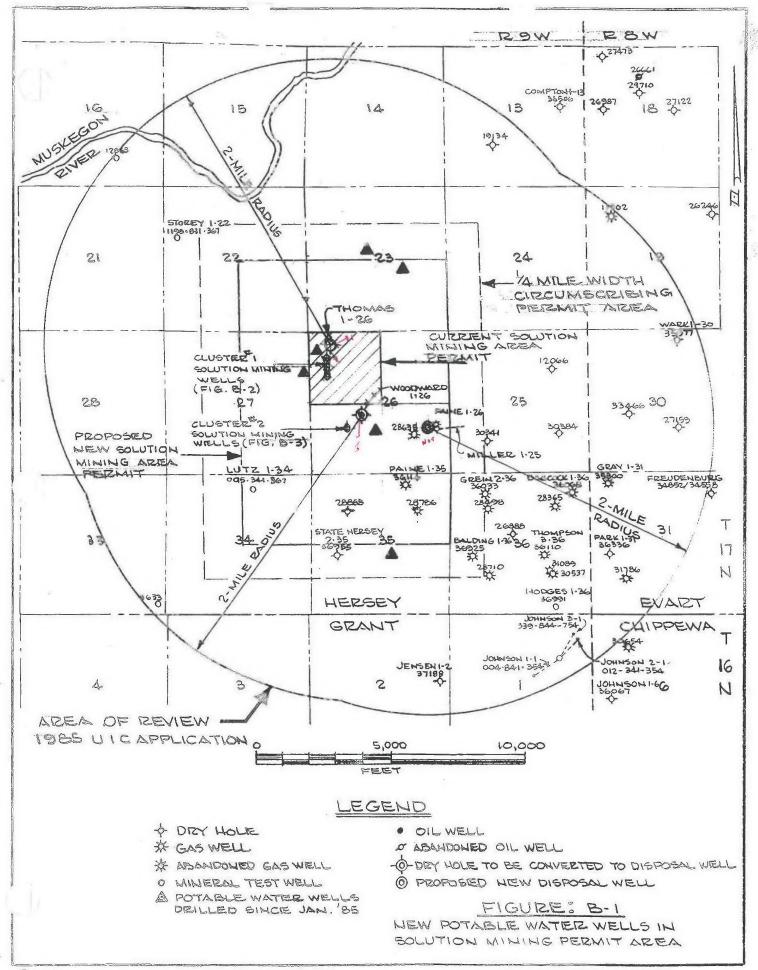
Oklahoma, Job#435, January, 1985

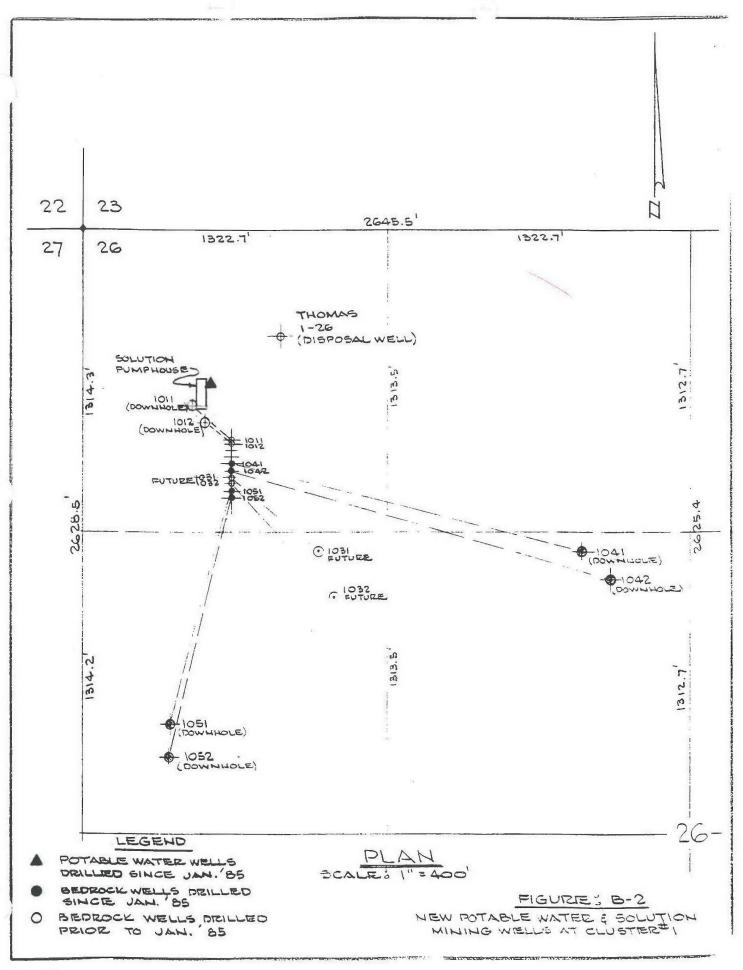
Permit No. MIA-133-3G-0001

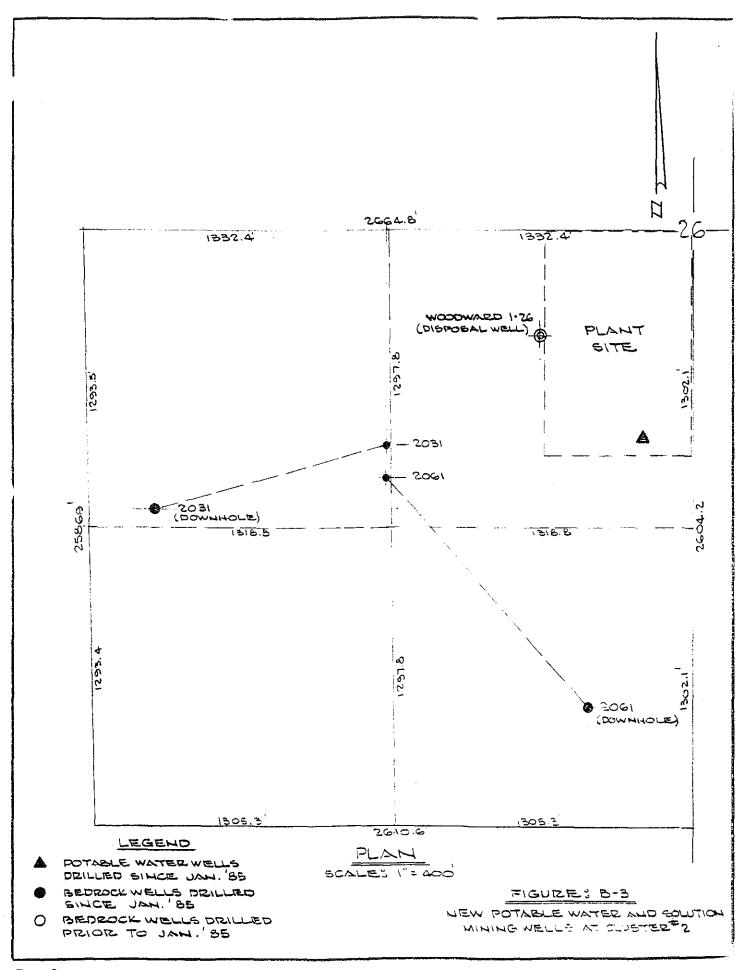
EPA Checklist Items:

- B. 1. Producing wells
- B. 2. Abandoned wells and dry holes
- B. 3. Water wells
- B. 4. Road, residences, lakes, mines, quarries
- B. 5. Faults
- B. 6. Public water systems and other pertinent information, all from public records

The attached Figures B-1, B-2 and B-3 show the additional solution mining and potable water wells that have been drilled within the proposed new permit area. All other checklist items within the permit area remain unchanged from the January, 1985 application.







ATTACHMENT C

CORRECTIVE ACTION PLAN AND WELL DATA

Reference:

SOLUTION MINING PERMIT APPLICATION

U. S. POTASH SOLUTION MINING TEST FACILITY,

Osceola County, Michigan, Volume I, Attachments A-

D, For PPG Industries, Inc., Pittsburgh, Pennsylvania, by Fenix & Scisson, Tulsa,

Oklahoma, Job #435, January, 1985

Permit No. MIA-133-3G-0001

EPA Checklist Items:

C. 1. Corrective action plan for unplugged wells which penetrate injection zone.

Well records for all known wells drilled into bedrock within the large area of review outlined on Figure A-1 have been examined in detail. No improperly sealed, completed or abondoned wells which might transmit solution mining fluids into underground sources of drinking water were found. Therefore, no specific corrective actions appear to be necessary at this time.

In the unlikely event that some unforseen well failure which might jeopardize the underground sources of drinking water were to occur during test facility solution mining operations, the following corrective action procedure would be followed:

- 1) Immediately halt solution mining activity in the area.
- Notify the appropriate EPA and Michigan Department of Natural Resources personnel of the discovery of the well failure problem. (Telephone notification to occur within 24 hours of discovery of the problem, and written confirmation to be transmitted by letter within five days.)
- 3) Conduct an investigation of the well failure problem and develop a plan of corrective action to eliminate the problem.
- Perform the necessary remedial work.
- C. 2. Tabulation of all wells penetrating zone with:
 - a. well construction data
 - b. operator
 - c. cementing data

- d. distance
- e. date drilled
- f. depth
- g. plugging records

Table C-l presents a tabulation of new bedrock wells drilled within the proposed permit area since the January, 1985 UIC application. Individual well completion reports are also attached.

- C. 3. Overall effect on the hydraulic gradient in potentially affected USDW's:
 - a. Corresponding changes in potentiometric surfaces and flow directions
 - b. Monitoring system designed to detect (a).

The injection of water for solution mining of potash in the A-1 Evaporite will occur at a level several thousand feet below the glacial drift fresh water zone, so this injection per se' will have no effect on the potentiometric surface of the ground water.

The potentiometric surface of the fresh gound water will be affected by pumping water from shallow wells to supply leaching water for the solution mining. A hydrogeologic investigation was conducted to predict the impact that large commercial scale solution mining would have on the local ground water resources. This investigation projects, and subsequent operating data confirm, that no significant aquifer drawdown occurs. The results of this study were presented as Appendix VI to the Applicants Environmental Report, U. S. Potash Project, PPG Industries, Inc., Pittsburgh, Pennsylvania, July 1984. A copy was attached to the 1985 UIC Application.

TABLE C-1: Bed Rock Well Statistics

Current Status	Active	Active	Active	Active	Shut in	Shut in
Date Drilled	02/26/85	05/25/85	03/27/85	05/24/90	03/27/85	05/30/85
Type of Well	Solution Mining	Solution Mining	Solution Mining	Solution Mining	Solution Mining	Solution Mining
Deepest Formation Penetrated	Niagaran	A-1 Evaporite	A-1 Evaporite	A-1 Evaporite	A-1 Evaporite	A-1 Evaporite
Total Depth (feet)	8116	7892	8052	7950	8010	8066
Well Name and Number	1042	1051	1052	1044	2031	2061
Operator or Company	Kalium Chemicals	Kalium Chemicals	Kalium Chemicals	Kalium Chemicals	Kalium Chemicals	Kalium Chemicals
Mineral Well Permit No.	048-841-367	016-851-367	010-851-367	366-904-767	006-851-367	005-851-367
Oil & Gas Permit No.	; 1	1	ı	I	1	ı
Section	26	26	26	26	26	26
Lownship Section	Hersey, T17N,R9W	Osceola Hersey, T17N,R9W	Osceola Hersey, T17N,R9W	Osceola Hersey T17N,R9W	Osceola Hersey, T17N,R9W	Osceola Hersey, T17N,R9W
Cavity	Osceola	Osceola	Osceola	Osceola	Osceola	Osceola

Total depth is measured depth from rig floor. Wells are directionally drilled, therefore true vertical depth will be less than measured depth. Shut in wells were cased but have not yet been prepared for operation. ب م

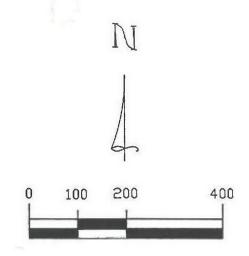
Note:

STATE OF MICHIGAN YPE OR PRINT REQUEST FOR TRANSFER OF , JERMIT PERMIT NO WELL TYPE 041-841-367 Minerals Exploration 4 COPIES TO: Department of Natural Resources FIELD NAME Geological Survey Division Box 30028 Lansing, Michigan 48909 WELL NAME AND NUMBER Filling for change of ownership of well is required in accordance with DAC! Kalium 1011 (formerly Thomas 2-26) 3t, P.A. 1939 and Arct 3l5 P.A. 1969, as amended, and Administrative VELL LOCATION Rules promulgated theraunder. SE 1/4 NW 1/4 NW 1/4 SECTION LOWNSHIP TRANSFER OF A PERMIT FROM: Hersey Osceola NAME(S) OF SELLING OWNER(S) PPG Industries, Inc. ADDRESS Number and Street -- City or Town -- Stare -- Zip Code -- Telephone (412) 434-2841 One PPG Place Pittsburgh, PA 15272 All operating rights are discharged by: Qwner(s) Representative(s) PPG Industries, Inc. R.J. Samelson ELIGIBILITY FOR PERMITS IS CONDITIONED UPON COMPLIANCE WITH THE STATUTES, RULES AND ORDERS OF THE DEPARTMENT OF NATURAL RESOURCES. PERMITS WILL NOT BE GRANTED TO PERSONS NOT IN COMPLIANCE. NON-SUBMISSION AND/OR FALSIFICATION OF THIS INFORMATION MAY RESULT IN FINES AND/OR IMPRISONMENT. TRANSFER OF A PERMIT TO: NAMERS) OF ACQUIRING OWNER(S) Kalium Chemicals, Ltd. ADDRESS Number and Street -- City of Town -- State -- Ziji Code -- Telephone 11126 South 140th Avenue, Hersey, MI 49639 (616) 832-3206 (We) (I) have acquired the well under this permit and assume full responsibility for the drilling, operation, and abandonment in conformity with the law, regulations and orders. SINGLE WELL SURETY BOND: ATTACHED BONDING CO. . BLANKET ON FILE BOND NUMBER_ All operating rights and responsibilities are assumed by Ówner(s) Representative(s) Signature(s) Date(s) Kalium Chemicals, Donald D. Metzger FOR DEPARTMENT OF NATURAL RESOURCES USE ONLY DISTRIBUTION BY DNR □ Lansing Acquiring Owner Selling Owner Field

	ATE OF MICHIGAN		YPE OR PRIN	T
REQUEST FOR	TRANSFER OF A PERMIT	PERMIT NO	WELL TYPE	
UBMIT 4 COPIES TO:	Department of Natural Resources Geological Survey Division	348-845-767	Solut	ion Mining
	Box 30028			
	Lansing, Michigan 48909	WELL NAME AND NUMBER		
	ip of well is required in accordance with □Act RA, 1969, as amended, and Administrative	Kalium 1011	(formerly	(Thomas 2-26)
ules promulgated the reunder		SE 1/4 NW 1/4 NV	N 1.4 SECTION 26	
TOANIO	ER OF A PERMIT FROM:	Hersey		Osceola
NAME(S) OF SELLING OWNER(S)	ER OF A PERMIT FROM:	1.01001		<u> </u>
ADDRESS Number and Street -	City or Town - State - Zip Goda - Telaphone			
One PPG Pla	ace, Pittsburgh, PA 1527	72 (4)	<u>12) 434-284</u>	
All operating rights are discharged	Ъ,			
Owner(s)	Representative(s)	Şignatur	** / .	Data(s)
DDC Twitter.	edes The D.C. Complete	#//	1 Sand	aliko
PPG Indust	ries, Inc. R.S. Samelson		/ Samolia	1- 1/6/88
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	PERMITS WILL NOT BE GRANTED TO PERSO			PRISONMENT.
NAME(S) OF ACQUIRING OWNER	والمراجع والمراجع والمراجع والمراجع والمراجع والمراجع والمراجع والمراجع والمراجع والمراجع والمراجع والمراجع والمراجع	A PERMIT TO:		
	micals, Ltd.			
	City or Town State - Zip Code Telephone			
11126 Sout	h 140th Avenue Hersey,	MI 49639	(616) 832-3206
(We) (I) have acquired the law, regulations and order	well under this permit and assume full responsers.	sibility for the drilling, ope	ration, and abandons	ment in conformity with the
AUBERU BAUR 🔲	CALCUE ANTE DATACHER PONDIN	0.00		•
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Kalium Cher	micals. Donald D. Metzger	Sound	Ware	4 9-19-88
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			Ďi:	STRIBUTION BY DNR

Lansing

Acquiring Owner
Selling Owner
Field



TH. MW #5

-26

TER WELL)

IG PIT

HEADS

Monitor Wells

				Screen
		Diam.	(in.)	Depth (ft.)
Cl. 1.	M.W1	2		90
	M.W2	2		97
	M.W3	2		80
	M.W4	4		100
	M.W5	4		85
	M.W6	4		100
	M.W7	4		75
	M.W8	4		92
	M.W9	4		106
Ts 1-26	M.W1	2		90
	M.W2	2		90
	M.W3	2		90
	M.W4	2		50
	M.W5	4		78

<u>Wilcox</u> Associates

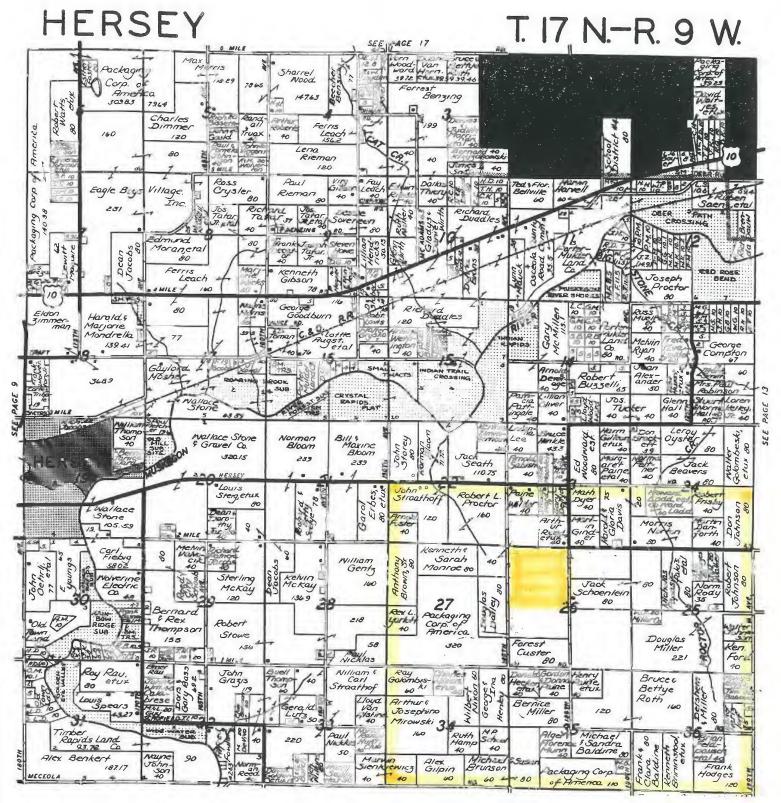


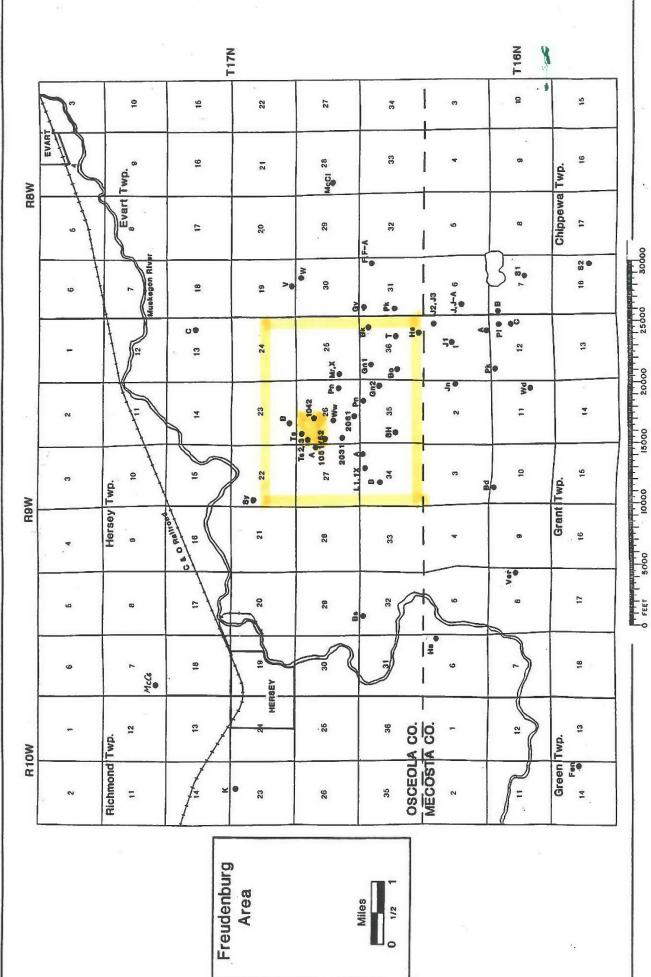
MANTON, MICH. (616) 824-6415 CLUSTER #1

SECTION 26, T 17 N, R 9 W

HERSEY TWP., OSCEOLA COUNTY, MICH.

9/27/89 JOB. NO. 89510





1051	Th 9 1-26 SFP	1041
2031	Wellheads	Ref.
		2061

Not to scale

etate of Michigan Arthent of Natural Rebources Geological Burvey Division

NERAL WELL COMPLETION REPO. TO BE FILED WITH THE SUPERVISOR WITHIN 60 L.. 78 AFTER COMPLETION OF WELL (ACT 315. P.A. 1888)

1001

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CASING OR LINER CEMENT JOB

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Size Cas	sing	13 3/8"	Sett	ing Depth _	908	Тор	(liner hanger)	
Hole Si	ze17½		Gradient			Visco	sity	
	Equipment		·					
Guid	le	si	hoe, manua	al fill_		float located	40	feet
ahove si								
				2 1 00 .				
Miscella								
Cement	t (around shoe	•)						
	No.		_				Slurry	Slurry
	Sacks	Brand	Туре	09/ 0	Additive	<u>\$</u>	Weight	Volume
(1) _	550	HOWCO	<u>Lite</u>	3% Ca	CT		12.4	<u>192</u>
(2) _	200	HOWCO	"A"	3% Ca	C1		15.6	42
Cement	t through DV	Collar at	fe e	t				
	No.						Slurry	Slurry
	Sacks	Brand	<u>Type</u>		Additive	<u>s</u>	Weight	Volume
(3) _								
(4) _	······································							

Cementing Prod	edure (around	shoe) (cros	s out where nec	essary)				
Circulated	30	minutes	s, pumped in _	10	(cu	. ft.), (<u>ba</u>	rrels)	
		prewash, use	d bottom plug	(yes, <u>no</u>), m	nixed ceme	nt (1) ab	ove	31
minutes, ceme	ent (2) above		10		minute	s, top pl	ug (<u>yes,</u> n	o) displaced with
136	(cu. ft.),	(barrels) in _	35	minute	s at rate o	of	4	BPM, CFM.
(Bumped plug)	(Did not b	ump plug).	Final Pressure		500			Reciprocated
pipe		feet while (i	mixing) and (di	splacing) cem	ent. Displ	acing tim	ie	
minutes. Had	i						circul	ation (full, partial,
none, etc.). C	ompleted job	at		a.m., p.m				
Cementing Proc	cedure (through	h DV at	feet)	(cross out wh	ere necessar	y)		
Opened DV at	:		a,m., p.m.,	circulated			min	utes, pumped in
								cement (3) above
								closing plug, dis-
								closing prog, dis-
		minutes	i. Had					circulation
(full, partial, r	none, etc.)							
Remarks (Third								
Had 40 barı	rels cemen	t return	to surface,	float he	ld, plug	down a	it 13:24	, 10–16–84.
				-				
							·	
						Mar	vin Wood	i

Foreman

CASING OR LINER CEMENT JOB

Size Casing	
Diff. fill shoe, diff. fill float located 33 above shoe, 1 DV collars located at 3660 and feet. 8 centralizers located every other joint scratchers located scratche	: iger)
Diff. fill shoe,diff. fill	
above shoe,	- ,
and	feet
centralizers located every other joint scratchers located	feet
scratchers located	
Liner hanger and pack off (describe)	
Miscellaneous (baskets, etc.)	`
Cement (around shoe)	-
No. Sacks Brand Type Additives Weig	
(1) 600 HOWCO Lite 2% CaCl 12.4	210 bbls
(2) <u>200</u> <u>Comm.</u> A <u>15.6</u>	6 42 bbls
Cement through DV Collar at 3660 feet	
No. Sacks Brand Type Additives Weig	· ·
(3) <u>800 HOWCO Lite 2% CaCl</u> 12	.4 280 bb1s
(4) 100 Comm. A 2% CaCl 15	

Cementing Procedure (around shoe) (cross out where necessary)		
Circulated 60 minutes, pumped in 10	(cu. ft.), (<u>barrels</u>)	
prewash, used bottom plug (yes, no), mixe	d cement (1) above _	30
minutes, cement (2) above6	_ minutes, top plug (y	es no) displaced with
410 (cu. ft.), (barrels) in 64 minutes a	t rate of 64	BPM, CFM.
(Bumped plug) (Did not bump plug). Final Pressure	1,000	
pipe feet while (mixing) and (displacing) cement	. Displacing time	64
minutes. Had		circulation (full, partial,
none, etc.). Completed job at 17:23 a.m., p.m.		
Cementing Procedure (through DV at 3660 feet) (cross out where	necessary)	
Opened DV at17:25 a.m., p.m., circulated	2	_ minutes, pumped in
	prewash, mi	xed cement (3) above
	minutes, dro	pped closing plug, dis-
placed with <u>277</u> (cu. ft.), (barrels) in <u>39</u>	minutes at rate	of <u>6.3</u>
BPM, CFM. (Bumped plug) (Did not bump plug).	Final Pressure	1500
Displacing time39 minutes. Had		circulation
(full, partial, none, etc.)		
Remarks (Third Stage Job, etc.)		
Good cement job.		
Had 15 barrels return on 1st stage and 10 barrels or	n 2nd stage	
	Marvin Wood	
	Forema	n

BEDROCK	TABLE
BEDROCK WELL STATISTICS	TABLE C-2 (REVISED)

	One 051 367		36	HERSEY TI7N, R9W	OSCEOI A
KALIUM CHEMICALS, LTD.	006-851-367		26	HERSEY TI7N, R9W	OSCEOLA
KALIUM CHEMICALS, LTD.	366-904-767		26	HERSEY T17N, R9W	OSCEOLA
KALIUM CHEMICALS, LTD.	010-851-367		26	HERSEY T17N, R9W	OSCEOLA
KALIUM CHEMICALS, LTD.	016-851-367		26	HERSEY T17N, R9W	OSCEOLA
KALIUM CHEMICALS, LTD.	048-841-367		26	HERSEY T17N, R9W	OSCEOLA
MARATHON OIL		38748	35	HERSEY T17N, R9W	OSCEOLA
MARATHON OIL	1213-831-367	36925	36	HERSEY T17N, R9W	()LA
MARATHON OIL	1384-821-367	36033	36	HERSEY T17N, R9W	OSCEOLA
HARRY L. MUTCH	و مساور مساو	28710	36	HERSEY T17N, R9W	OSCEOLA
HERSEY OIL AND GAS COMPANY		28498	36	HERSEY TI7N, R9W	OSCEOLA
WILLMET, INC.	1446-82-367	36355	35	HERSEY TI7N, R9W	OSCEOLA
MARATHON OIL	1409-821-367	36186	35	HERSEY T17N, R9W	OSCEOLA
J. O. MUTCH		28888	35	HERSEY T17N, R9W	OSCEOLA
HERSEY OIL AND GAS COMPANY		28786	35	HERSEY T17N, R9W	OSCEOLA
PPG OIL AND GAS COMPANY	027-841-367		34	HERSEY T17N, R9W	OSCEOLA
PPG OIL AND GAS COMPANY	025-841-367		34	HERSEY T17N, R9W	OSCEOLA
PPG OIL AND GAS COMPANY	024-841-367		24	HERSEY T17N, R9W	OSCEOLA
PPG OIL AND GAS COMPANY	005-841-367		3.4	HERSEY T17N, R9W	OSCEOLA
MARATHON OIL	1254-831-367	37519	26	HERSEY T17N, R9W	OSCEOLA
MARATHON OIL	1253-831-367	37317	26	HERSEY T17N, R9W	OSCEOLA
KALIUM CHEMICALS, LTD.	1217-831-367	36942	26	HERSEY T17N, R9W	U. DLA
KALIUM CHEMICALS, LTD.	042-841-367		26	HERSEY T17N, R9W	Occident VIOLA
KALIUM CHEMICALS, LTD.	041-841-367		26	HERSEY T17N, R9W	OSCEOLA
PPG OIL AND GAS COMPANY	021-841-367		26	HERSEY T17N, R9W	OSCEOLA
PPG OIL AND GAS COMPANY	020-841-367		26	HERSEY T17N, R9W	OSCEOLA
KALIUM CHEMICALS, LTD.	1248-831-367	36600	26	HERSEY T17N, R9W	OSCEOLA
HARRY L. MUTCH		28635	26	HERSEY T17N, R9W	OSCEOLA
J. O. MUTCH		30341	25	HERSEY T17N, R9W	OSCEOLA
COMPANY OR OPERATOR	NUMBER	NUMBER	SECTION	TOWNSHIP	COUNTY
	WELL PERMIT	PERMIT			
	MINERAL	OIL AND GAS			

1. TOTAL DEPTH IS MEASURED DEPTH FROM RIG FLOOR. SOME WELLS ARE DIRECTIONALLY DRILLED, TI
2. "ON HOLD" WELLS WERE CASED BUT HAVE NOT YET BEEN PREPARED FOR OPERATION.

NOTE:

3. TABLE C-1 WAS REVISED ON NOVEMBER 12/91 TO INCLUDE INFORMATION ON WELLS DRILLED PRIOR T

Note 1

This is an application for a Class III solution Mining Area Permit. Within this area there are wells currently being operated under an existing UIC permit, MIA-133-3G-0001, wells that will be converted for solution mining operation and proposed wells to be drilled in the future.

Note 2

Two existing wells within area to be converted for solution mining operation by the end of 1992.

Up to three new wells to be drilled within area for solution mining operation by the end of 1992.

SOLUTION MINING PERMIT APPLICATION

FOR

U. S. POTASH PROJECT
OSCEOLA COUNTY, MICHIGAN
CLASS III AREA PERMIT

ATTACHMENTS A - U

FOR
KALIUM CHEMICALS, LTD.
HERSEY, MICHIGAN

October 18, 1991

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INTRODUCTION

PPG Industries, Inc. (PPG) discovered significant potashbearing deposits in an area spanning the border between Mecosta and Osceola Counties in Michigan. The potash mineralization occurs within the A-1 Evaporite of the Salina Group of formations which lie 7500 to 7800 feet below surface.

PPG constructed and operated a solution mining test facility in 1985 and 1986 to confirm the workability of solution mining techniques and to demonstrate the feasibility of injecting disposal brine into a suitable porous and permeable subsurface rock formation. Potash minerals were not extracted from the brine produced during the test facility operation. PPG operated this facility under UIC Class I Disposal Well permits MI-133-1I-0001, MI-133-1I-0002 and MI-133-1I-0003, and Class III Solution Mining Well area permit MIA-133-3G-0001. Results from the test facility were encouraging, however, a downturn in the Potash industry forced PPG to terminate testwork in July 1986 and delay expenditures on a commercial production facility.

In November, 1987 PPG sold all of its Potash interests, including the Michigan project, to Sullivan and Proops (S & P) of Chicago. The EPA operating permits were transferred to Kalium Chemicals, Ltd. (Kalium), a fully owned subsidiary of S & P.

In 1989 Kalium constructed a small commercial production facility to process the potash brines produced from the solution mining wells. The location of this facility is shown in Figure 1. The facility remains in operation today and plans are currently being formulated to expand mining beyond the borders of the current UIC permit area.

This report is part of the application for a new UIC Class III area permit to include an expanded mining area and to clarify and modify certain aspects of the current permit. Instructions for UIC Form 4, EPA's Underground Injection Control Permit Application, call for submittal of comprehensive project supporting data in the form of a series of attachments designated A through U. Most of the information presented in the original permit application prepared by PPG is still valid and will not be resubmitted with this application. References to information in the original application have been made where appropriate.

The disposal wells permitted in 1985 continue to provide adequate brine disposal capacity, therefore no revisions to the UIC Class I permits are being requested at this time.

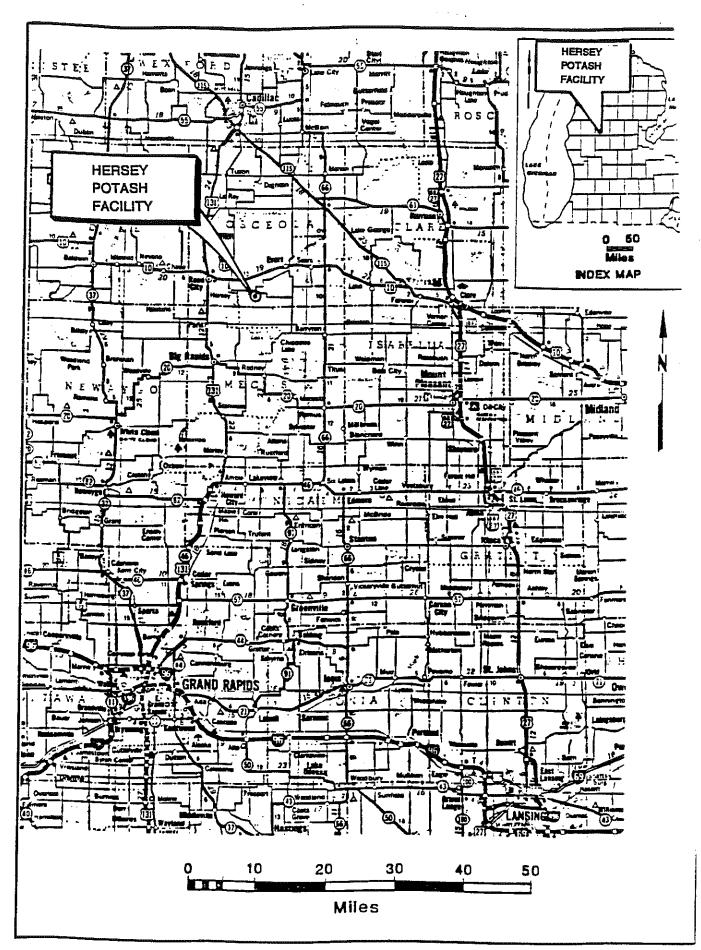


Figure 1. Location Map

WW ENGINEERING & SCIENCE ENVIRONMENTAL LABORATORY DIVISION

CLIENT: KALIUM CHEMICALS

PROJECT NO.: 27497

LOCATION: SOLUTION FEED PLANT

SAMPLED BY:

DESCRIPTION: MONTHLY MONITORING

DATE SAMPLED: 00/00/00 TIME:

DATE RECEIVED: 08/08/91 TIME: 12:30 PM

DATE COMPLETED: 08/26/91

SCHEDULED COMPLETION: 08/26/91

ANALYST: MRJ, AMF, GEP, JW

QUALITY CONTROL REVIEW BY: CS, BJD

WORKSHEET NO: 10

					DETECT:	ON UNITS
	1051 RETURN	1011 RETURN	1042 RETURN	RECYCLE INJECTION		
LAB SAMPLE NO:	70679	70680	70681	70682		
ALKALINITY, TOTAL	58	90	134	65	2.0	mg/l CaCO3
CONDUCTIVITY @ 25 C	637,200	645,700	560,100	631,500	5	umhos/cm
CHLORIDE, TOTAL	205,000	168,000	202,000	199,000	2.0	mg/1
PH VALUE	6.13	6.72	6.84	7.22	#60-bas 640	std. units
RESIDUE, DISSOLVED	377,000	364,000	306,000	308,000	1	mg/1
SPECIFIC GRAVITY	1.2308	1.2282	1.2060	1.2268	60	deg F.
SULFATE	1,560	1,410	1,040	1,610	5.0	mg/l
SULFIDE, TOTAL	22	23	2.8	12	1.0	mg/l



Analytical Laboratories

ANALYTICAL REPORT

CLIENT: Kalium Chemical Co.
PROJECT: N/A

LAB REF. NO.: 10414

SAMPLED BY: LRC

DATE SAMPLED: 02/14/91

DATE RECEIVED: 02/15/91

DATE FINISHED: 03/06/91

DESCRIPTION: Water Sample REPORT DATE: 03/06/91
ANALYST: CC, JC, JS, EB, TJ

IRON	•	s •	•	•	•	•	4.6 0.02
SODIUM		٠	٠	•		•	101,400 0.002
		٠	٠	٠	•	٠	140 10
							ND 10 220,000 1
SULFATE	•	•	•		•		1850 5
CONDUCTIVITY @ 25°C umhos/cm			•	•	•	•	643,800 0.01
TOTAL DISSOLVED SOLIDS SPECIFIC GRAVITY, @ 4°C	•			•		•	338,000 1 1.214 0.001
ION BALANCE	•	٠	9	•	٠	•	-16

ND = Non Detectable
Results are in mg/L; Unless otherwise stated.

Gerald T. Skar Laboratory Director nef





Page 1 of 1

ANALYTICAL SERVICES

PROJECT: PPG Industries

ASI REF. NO.: 51416

SAMPLED BY: PPG Industries

DESCRIPTION: Water Sample

DATE SAMPLED: 3/14/86

DATE RECEIVED: 3/18/86

DATE FINISHED: 4/01/86

REPORT DATE: 4/02/86

ANALYST: LBC, DRS, TBS, TDS, RJA

ASI SAMPLE I.D. CLIENT SAMPLE I.D.	9000 86-03-14-01 Solution Mining	Disposal Well
BICARBONATE, mg/L		
CARBONATE, mg/L	0	0
CALCIUM, mg/L	301	215
BARIUM, mg/L	<.1	<.1
CHLORIDE, mg/L	100,500	44,300
CONDUCTIVITY, umbos	16,667	87,719
TOTAL IRON, mg/L	0.09	0.50
MAGNESIUM, mg/L	119	104
pH 0 20 C, s.u	7.4	7.8
SODIUM, mg/L	65,000	28,000
SULFATE, mg/L	1,200	960
SULFIDE, mg/L	0.6	0.2
ION BALANCE, &	4.1	1.4

AQUATIC SYSTEMS, Inc.

Robert J. Allard, Jr. Lab Director

ATTACHMENT A

AREA OF REVIEW

The EPA's Underground Injection Control regulations call for comprehensive investigations of an "area of review". The area of review for an area permit may be defined as a fixed width of not less than one-fourth (1/4) mile for the circumscribing area.

The original brine disposal feasibility study for the project included a detailed examination of a large study area defined by connecting the arcs of two mile radii circles drawn around the three permitted disposal wells. Kalium proposes to define the new solution mining permit area to include the following lands in Hersey Township, Osceola County, Michigan.

```
SE 1/4 of Section 22, T17N, R9W
S 1/2 of Section 23, T17N, R9W
E 1/2 of Section 27, T17N, R9W
All of Section 26, T17N, R9W
NE 1/4 of Section 34, T17N, R9W
N 1/2 of Section 35, T17N, R9W
```

Kalium's current area permit consists of just one 1/4 section, specifically the NW 1/4 of Section 26, T17N, R9W.

The solution mining wells are directionally drilled from central surface locations called clusters. The new permit area will contain the currently permitted Cluster No. 1 wells plus additional wells at a new Cluster No. 2 location. Future clusters will be developed radially from Clusters 1 and 2.

Figure A-1 shows the proposed new solution mining permit area, the current solution mining permit area, and the larger study area. Figure A-1 also shows the 1/4 mile width circumscribing the permit area of this application.

Within the larger study area a thorough search was conducted to identify all wells which penetrate the bedrock and to determine the casing and plugging details and current status of each. In addition, a survey of surface and underground fresh water resources and water wells was performed by Keck Consulting Services, Inc. of Williamston, Michigan for all of the study area except for a small area on the north side of the Muskegon River. This work was completed for the 1985 UIC permit and was updated for this application.

EPA Checklist Items:

- A. 1. Permeability of disposal zone
 - 2. Net thickness of disposal zone

